THE IRON AGE

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A Flexible Heat-Treating Installation

Quenching Facilities and Accurate Control of Furnace Temperatures Conspicuous Features of Equipment of Link-Belt Works at Indianapolis

The products manufactured by the Link-Belt Company at its Ewart Works, Indianapolis, are such as to require the heat treatment of a wide variety of parts. This variety not only involves the question of size of the pieces, ranging from small pins 0.003 in. in diameter to pieces of various shapes and weighing several pounds, but also covers the treatment of both hot and cold rolled stock, which must be prepared for composite service. Continuously heat treatments for about 1100 different parts are conducted. The equipment installed to meet this wide range of requirements is illustrated in the accompanying views.

The heat treating department is located in one bay of a steel frame building, the other half of which houses the upsetting and forging department. Maximum ventilation and light are obtained by means of the sawtooth roof construction, which parallels the length of the shop to give a north light exposure, the lighting panels being fitted with continuous sash hung to swing open on vertical axes. Gas, oil and cyanide furnaces are installed, but the special features of the installation have to do largely with the provisions for quenching the heated materials and for regulating the furnace temperatures.

In Fig. 1 is presented a view of a battery of three large and one small, rotary, gas furnaces of the retort type. These are operated on city illuminating gas. The arrangement of these furnaces is interesting with reference to the quenching tank in the foreground. This tank has an overall depth of 7 ft. 9 in., is 48 in. wide inside, is built of 3/16 in. plate and can be constructed with whatever length is required by the number of furnaces in connection with which it is used. The tank itself serves as a water cooling basin. Built in the tank, as shown in the illustration, are the oil baths.

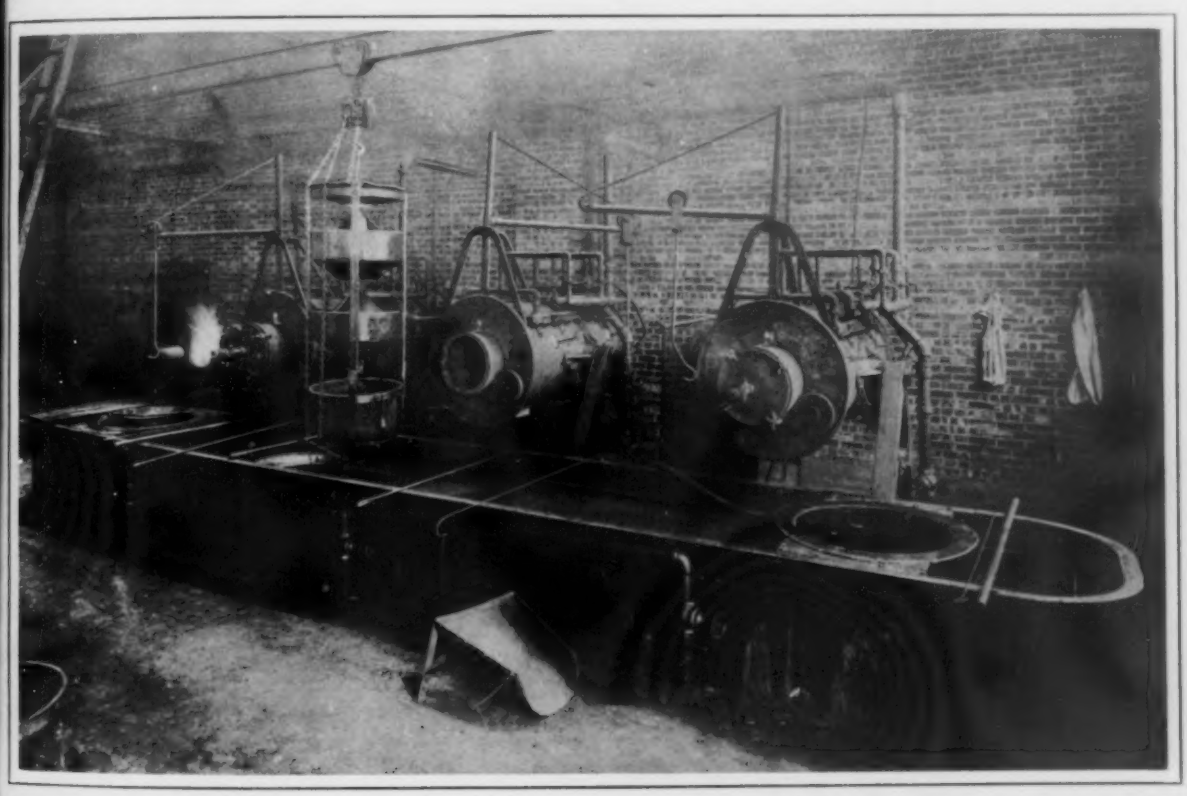

Fig. 1—Rotary Carbonizing Gas Furnaces and Quenching Tank. The vertical cooling tubes in the oil bath may be seen. Water can be admitted into the tank in sufficient volume to change the bath in approximately 11 min.

The details of this construction are shown on the accompanying line drawing, Fig. 2. Around the

circumference of this oil bath, boiler tubes are inserted vertically, and through them cold water continually circulates. To enhance this cooling effect an air jet is directed in the oil so as to set up a circulation of the oil from the center of the bath outward toward the water cooling tubes. The construction of the cage into which the heated materials are discharged from the furnace, to be quenched, also contributes to the desired cooling effect. The cage is of a diameter such as to permit its being lowered into the oil bath. The furnace discharges by means of the detachable chute shown in the foreground into the top of this cage, which is built with successive, conical baffle-plates which not only retard the passage of the parts through the oil to the basket at the bottom, but

ment of the quenching tanks on either side of each furnace, affording a water and oil bath, and the manner in which the aprons in front of the furnace provide for discharging the treated pieces, are the interesting features. As shown in the illustration, the carbonizing compound drops, when the box is emptied, through the grating into a receptacle below for subsequent use. A hinged section of the apron is turned up, preventing any of the parts from rolling off. The arrangement here devised also permits of a slow initial cooling where that is desired, as in the case illustrated in this photograph. It is also apparent that the pieces may be emptied into the bath on either side.

The design of the carbonizing boxes is also worthy of being noted. On the side of the box,

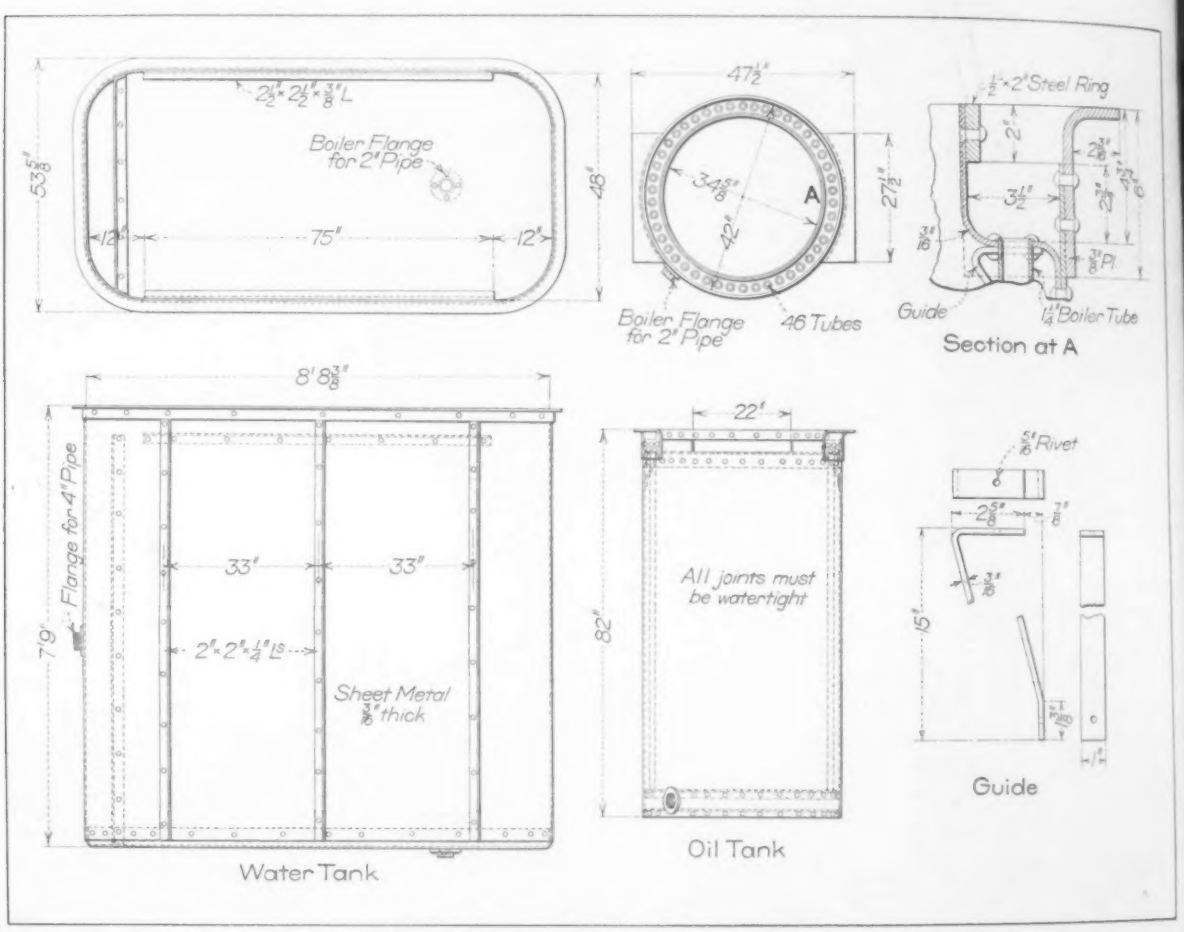

Fig. 2—Details of the Quenching Equipment

promote a much more intimate contact between the pieces and the cooling liquid. The entire cage can be raised and lowered out of the oil or the water bath by means of the overhead hoist as indicated.

Another battery, of stationary furnaces, is shown in Fig. 3. These furnaces are used for treating work of smaller size, and it will be noted that the cooling cage shown in the center of the view is enclosed with wire screen, to keep the very small parts from falling out. The quenching tank in this instance affords the same advantages as the larger tank serving the rotary furnaces. As may be readily seen, it is possible to quench either in water or oil, as desired. The more distant furnaces shown in the illustration are oil burning. These are converted, gas-burning furnaces, adapted for oil burning through the expedient of increasing the combustion chamber size by raising up the back of the furnace.

The type of furnace in which the larger pieces are heat treated is shown in Fig. 4. The arrange-

at the bottom, are lugs over which the long charging fork, manipulated by the heater, fits. By this means the box may be charged into the furnace and withdrawn very handily. On the bottom of the box other lugs are cast, just high enough to permit a circulation of the furnace gases between the box and the bottom of the furnace, so that there is a similar exposure to the furnace temperature on all sides of the box.

The water supply is obtained from a driven well equipped with an air lift, which discharges into a reinforced concrete storage tank built under the floor of the building. This tank has a capacity of 100,000 gal. The circulation of the water is obtained with a 275-gal. motor driven, centrifugal pump which is run continuously. The air and oil circulation supply units are combined as shown in Fig. 5. This consists of a low-pressure blower driven by Link-Belt silent chain drive from motor, and arranged with an automatic pressure regulator shown at the right. The regulator consists of a

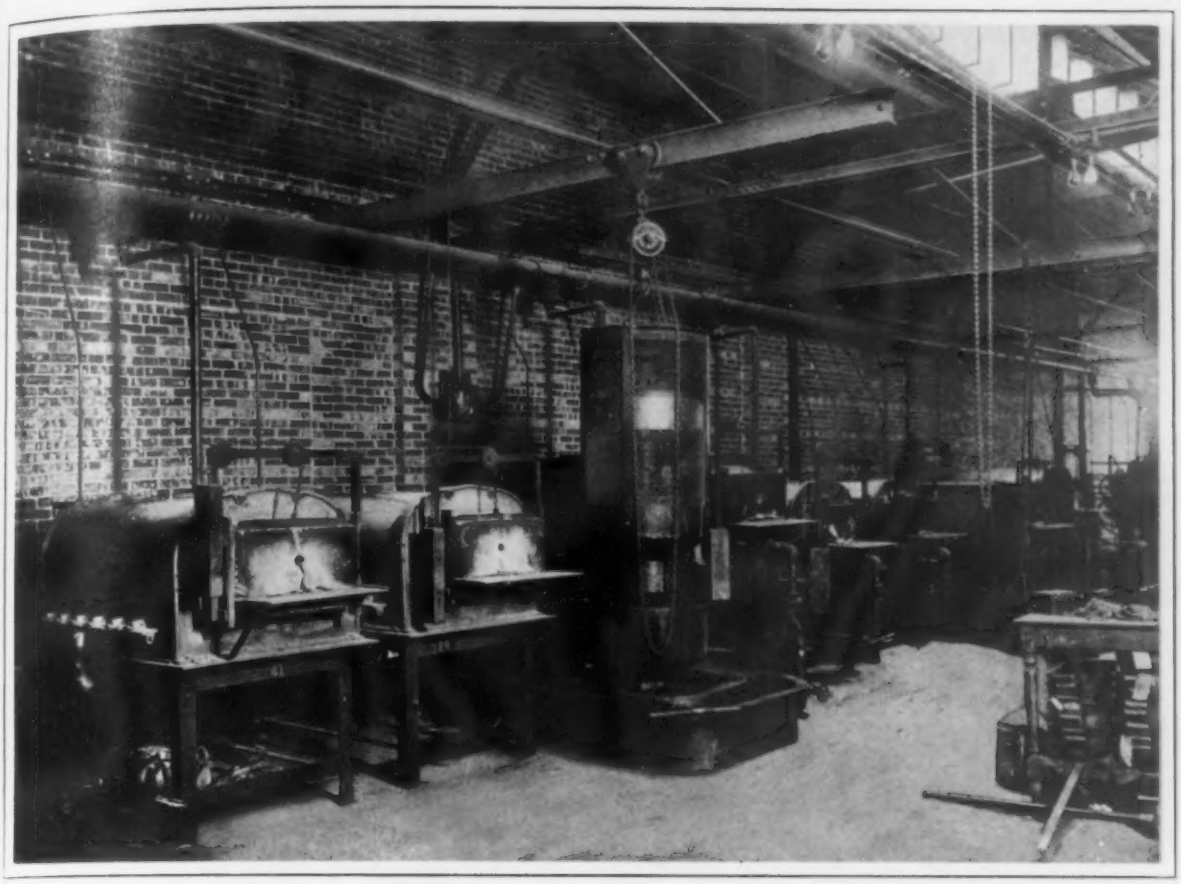

Fig. 3—Stationary Gas and Oil-Fired Furnaces for Treating Very Small Parts. The thermostat temperature equalizer is shown on the wall back of the furnaces

starting rheostat controlling the driving motor, the arm of the rheostat being swung by the action of a piston in the small air cylinder mounted below the rheostat. From the piston a counter-balancing weight is hung, so that as the air-receiver pressure under the piston increases the piston moves up and the motor slows down. To the same shaft which drives the blower, the oil pump is connected and being driven from the one motor, a fixed relation is thus established between the air blast and the flow of oil.

The provisions for controlling the furnace temperatures are unusually complete. In Fig. 3, a part of the row of lights suspended in pairs oppo-

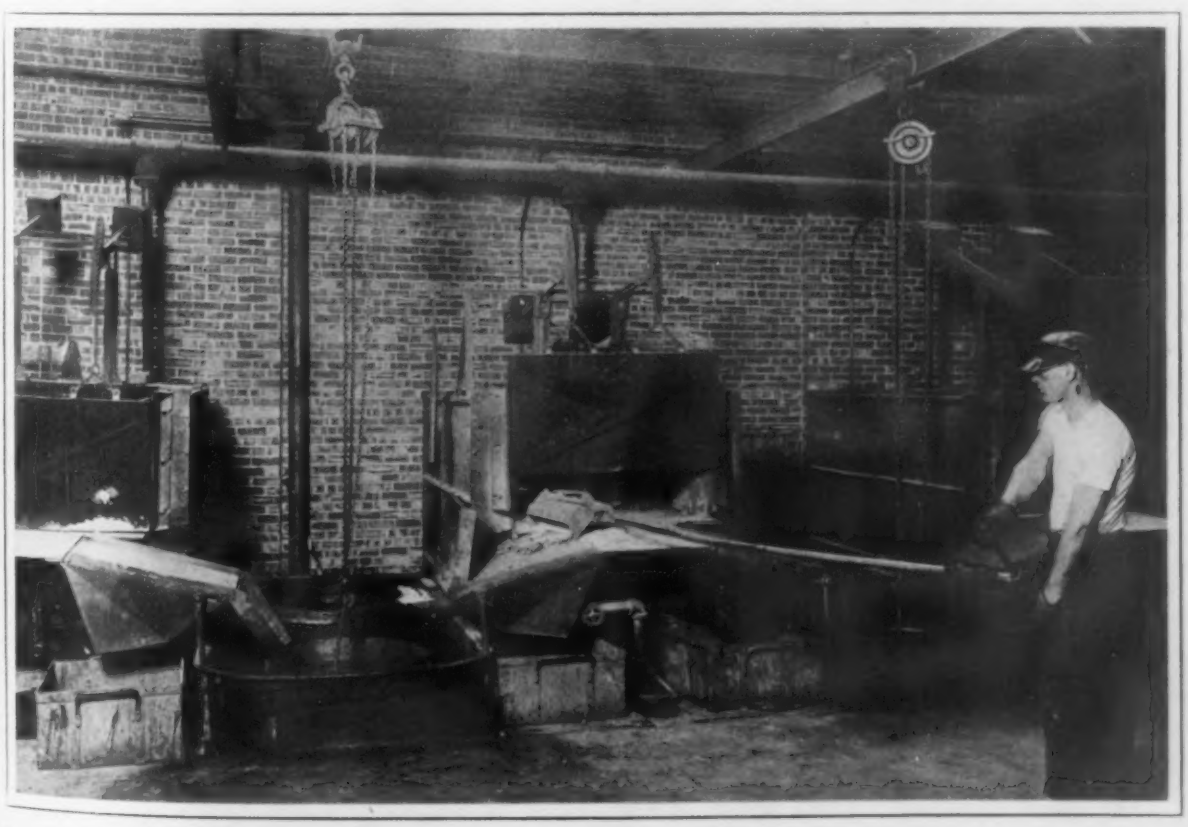

Fig. 4—Stationary Furnaces for the Larger Work, Equipped with Aprons and Quenching Baths that Admit of Unusual Flexibility in Disposition of Materials

site each furnace is shown. Each pair consists of a red and a blue light. The lighting of either the red or the blue lamp is controlled from a switchboard by an operator located in a central pyrometer room. This operator notes the temperature of each furnace every fifteen minutes, and if it is too high he warns the furnace operator by throwing on the red light, and if too low the blue light. No light at all indicates that the furnace is at a proper temperature.

Fig. 6 shows the instrument board at which

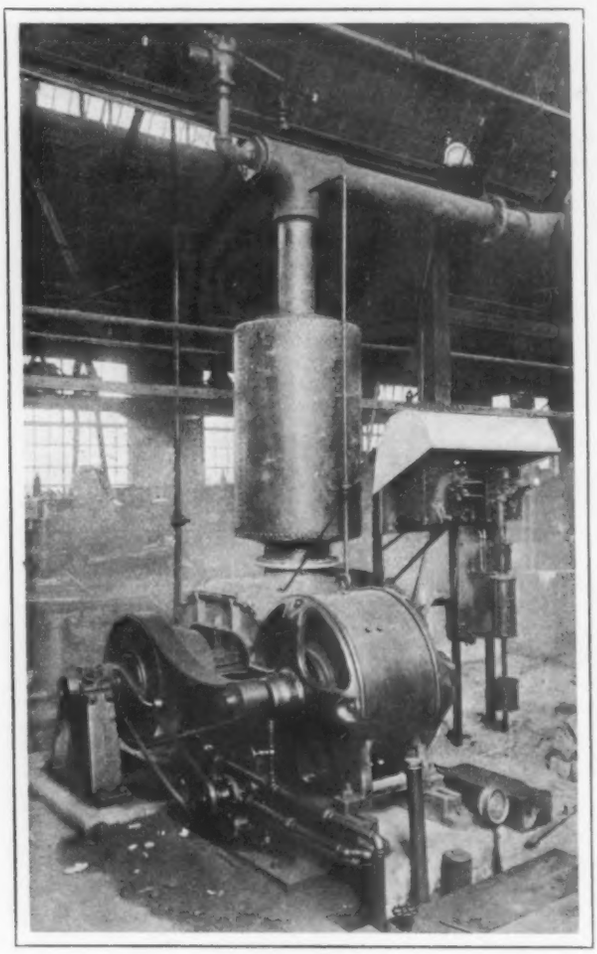

Fig. 5—The Air and Oil Supply Units

the operator works, and also the record sheet of furnace temperatures, a detail view of which is shown in Fig. 7. This board provides three checks on the temperature. The pyrometer connection from each furnace is brought to the contact board shown in the center, which connects up with the pyrometer in the same case. Immediately above is another pyrometer, which may be thrown in on any one furnace by plugging in through the switch board at the left. A third check may be had by connecting up the recording instrument above the switch board. The switch board control of the lights is shown at the right of the operator, who by means of the single-pole, double-throw switches

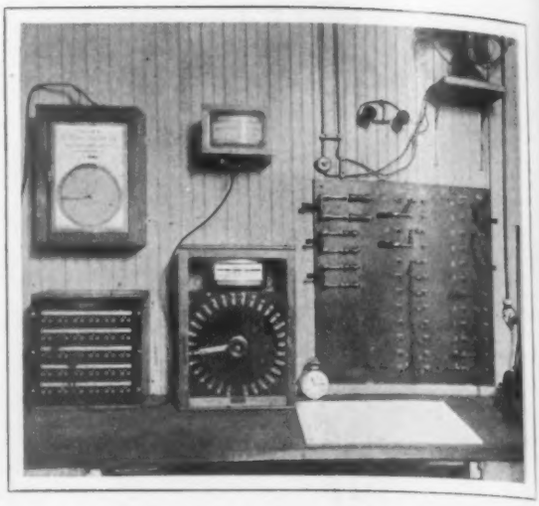

Fig. 6—Mounting of Instruments and Switchboard for Recording and Controlling Furnace Temperatures. The equipment was supplied by the Brown Instrument Company

notifies the furnace operators of the temperature conditions at any furnace. The record blank shown in Fig. 7 is self explanatory, the actual temperatures being set down for each 15-min. interval opposite each furnace, as designated by letter.

To equalize the temperature variations, the cold ends of the pyrometer couple for each furnace are brought to a central thermostat box shown mounted on the wall in Fig. 3. This thermostat is set for a temperature slightly above the maximum temperature of the room. Enclosed in the box with the thermostat are two incandescent lights, which immediately light up when the temperature drops below the set limit, and as the proper temperature in the box is resumed, the lights are automatically shut off. The maximum and minimum temperatures of the cold ends are thus fixed within very narrow limits. As a further safeguard, the terminals in the box of the connections of the recording instruments are made of the same metals as the terminals of the couple, so that the temperature effects are identical. Precaution is taken also to equalize the resistances in all the pyrometer circuits, the varying distances of the furnaces from the thermostat box being compensated by German silver coils.

Large British Buying of American Billets

War exports of steel blooms, billets and slabs from the United States to Great Britain show a large increase over previous records. For July, this year, Great Britain imports from this country were 55,417 gross tons against only 2365 tons in July, 1914. The total for one year of the war, Aug. 1, 1914, to Aug. 1, 1915, is 217,673 tons against 23,759 tons for the year preceding. This is an increase of 89 per cent due to war demands. The bulk of these exports, or 208,271 tons, has gone out since Jan. 1.

The Toledo Machine & Tool Company, Toledo, Ohio, has effected an agreement with its employees for an 8-hr. day and 48 hr. per week, with no reduction in wages. The plant has been running 50 hr. per week.

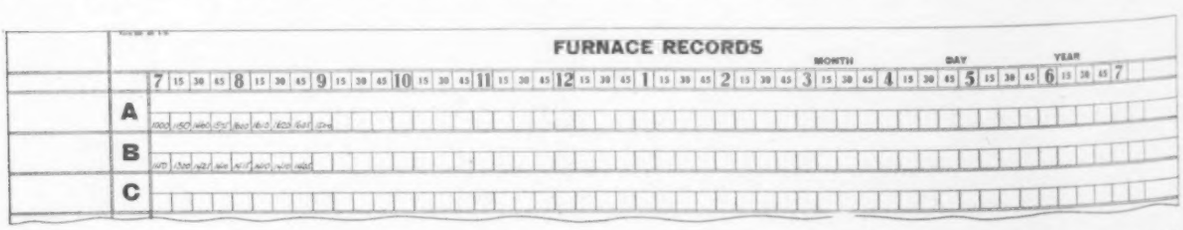

Fig. 7—Upper Part of Large Sheet for Keeping Fifteen Minute Readings of Furnace Temperatures, Letters Designating the Different Furnaces. The sheets are filed in a loose-leaf binder

CARELESSNESS IN THE FACTORY

Overcoming Injuries to Workmen, the Machines and the Work

BY ALBERT A. DOWD

The effects of carelessness in the factory are far reaching and are continually felt in every department, no matter how small or unimportant it may be. Involving as it does the human factor, it is a difficult matter to take precautionary steps which will tend to minimize the effects, without first analyzing the conditions which are responsible for the trouble. Effects of carelessness in the factory include injuries to the workman, to the machine or tools and to work in process of machining and inaccurate work.

These four items cover practically all points which are the direct result of carelessness in the factory, and by analyzing the causes which produce the trouble it is possible to get at the root of the matter and apply a suitable remedy.

The importance of keeping the floors clean and free from oily compounds must not be lightly considered, for an operator may receive a serious hurt by slipping on an oily floor. Several years ago I saw a man badly hurt because the pump connections on his machine were in a leaky condition so that the floor around the machine was more or less slippery. The operator was standing close to the machine and was engaged in tightening a set screw in a tool holder, leaning over considerably to get at it better. One of his feet slipped and the wrench flew out of his hand as he fell forward, one of his wrists coming down with force on the edge of a roughly machined surface which was as sharp as a razor, with the result that it was laid open to the bone, and it was several weeks before the man was able to resume work. Neglect in repairing the pump was the direct cause of this accident, for if the floor had not been slippery the man would not have been injured.

It occasionally happens that a milling fixture is so designed that an operator has to work rather close to the cutters when tightening clamps or placing the work in position. If the machine is stopped at the time, there is no danger of injury to the workman, but it is common practice to leave the machine running while removing or replacing work. The foreman should discountenance this procedure and should see that the rule is enforced, for it is largely due to a neglect of this precaution that injuries result.

INJURY TO MACHINE OR TOOLS

It will usually be found that machine accidents are much more frequent with men who are not entirely familiar with the construction of the machines, while operators who are well posted in this regard seldom have much trouble. The natural remedy, therefore, is to see to it that each operator has a good working knowledge of the machine on which he is engaged and that he understands enough of the construction to realize the importance of the principal features. Devices are found on nearly all machines of modern design to prevent an operator from engaging two sets of gears at the same time and to prevent breakages when stresses reach a certain limit, but there is nothing to prevent a tool or holder from striking a revolving part if it happens to be brought into the position which will cause an interference. In turret lathe work the greatest care is sometimes necessary to avoid interferences of this kind between the turret and cut-off slide tools, and there is no way of avoiding trouble except the vigilance of the operator, and a moment's carelessness is often sufficient to break or strain a machine or tool in such a way that repairs are necessary before it can be used again. Mistakes of this kind involve the human element to so great a degree that very little can be done to counteract them, except by making an effort to obtain men who are particularly careful in their work.

INJURY TO WORK IN PROCESS OF MACHINING

Take a machine, for instance, on which the knock-off has a tendency to stick, due to a weak spring which should have been replaced with a new one. It is obvious that a condition of this kind might easily result in spoiling a piece of work. A report may have been sent in weeks before, calling attention to the defect in the working of the machine and yet the matter may be neglected, because it seems of so little importance. The upkeep and general repair work in any factory is a factor of such importance that its neglect is frequently the cause of injury to work in process, and it should therefore receive due consideration. Improperly designed tools or fixtures are often the source of injury to work because of imperfect locating or insecure clamping. Lack of provision for chip clearance on a tool or fixture is a frequent cause of trouble, and here the remedy lies in the design, which should have taken these things into consideration. Carelessness in looking after important features in design has an effect on the production of the work, and too much attention cannot be paid to the points of clamping and locating work, as scrapped material is not profitable.

INACCURATE WORK

The type of carelessness which results in inaccurate work is very common and it is not altogether confined to the operator who is responsible for the production, although he frequently has a hand in it. I knew of one case where a lot of pulleys were machined to the correct size, with the exception of a few pieces in which the hole was from 0.001 to 0.002 in. undersize. An inspection showed that the work was all reamed with the same tool and this was found by calipering to be up to size, so that it was something of a mystery to understand why the holes should not all be standard. The pulleys were of steel and were ordinarily machined with a supply of cutting lubricant to keep things cool, but an inquiry developed the fact that the pump which supplied the lubricant got out of order during the process of machining, and as a consequence a few pieces were machined dry. As considerable heat was generated before reaming the holes naturally contracted after machining, so that those machined without the lubricant were a trifle undersize. A few minutes' work in putting the pump in order would have obviated the trouble. Dull tools and carelessness in taking occasional measurements when a lot of pieces are being machined oftentimes results in inaccurate work and the department foreman who allows a lot of work to be machined without an occasional inspection is guilty of negligence, as also is the workman who does not keep his tools in proper condition. Inaccuracies are often produced by improper methods of holding and clamping which cause distortion. This is especially noticeable on work of a thin and fragile nature. Remedies for this kind of inaccuracies are obvious.

New Forge and Heat-Treatment Plant

D. K. Bullens & Co., consulting metallurgists, Frankford, Philadelphia, have completed the design and erection of a forge and heat-treatment plant for Cann & Saul, Royersford, Pa. The present hammer equipment consists of two 2000-lb., one 1200-lb. and one 900-lb. hammers, with a layout for tripling this capacity. The heating is done with Bullens oil-burning furnaces designed especially for the work in view. The heat-treatment furnace and equipment are of the latest type for accurate work. The entire plant has been designed along lines somewhat new in forge shop lay-out, aiming to conserve labor costs, develop the greatest efficiency possible, and yet provide pleasant working conditions for the men. The machine shop will be housed in a building 40 x 116 ft. D. K. Bullens & Co. have also been retained as consulting metallurgists for the new plant.

Frank Orth, Indiana Harbor, Ind., is installing the Orth reinforced roof in two open-hearth furnaces for the Kokomo Steel & Wire Company and has granted a license to the American Steel Foundries for the adoption of this construction for all of its furnaces, of which four are now being so equipped.

Equipment for Forging Shrapnel Cases

What Machinery Is Needed in a Given Plant to Make Forgings for Projectiles —The Processes Commonly Employed

BY C. A. TUPPER*

Now that the manufacture of projectiles for field guns has become sufficiently standardized in Canada and the United States to permit a general survey of the situation, it will be in order to consider just what the industry comprises. Many owners or managers of general machinery building and metal-working plants contemplate entering into war contracts or sub-contracts. All such are naturally interested in knowing just what shop operations are comprised in shell-making, how far their present plants can be adapted to the process and what new equipment, if any, it will be necessary or desirable to secure; while those already engaged in the industry are taking steps to acquaint themselves with the practice in other shops similarly occupied, so as to determine whether any changes or additional investment will be beneficial. The following notes, devoted to the forging of shrapnel cases, have accordingly been prepared with these questions in mind. Machining, heat treatment, finishing and assembling will be taken up later.

OBTAINING THE BLANKS

Specifications in detail are supplied by the war department of the nation interested and they must be rigidly adhered to. After steel of the proper quality—which will approximate 0.4 to 0.5 carbon, 0.6 to 0.7 manganese and 0.3 silicon—has been secured from the mill, the first operation in the manufacture of shrapnel is cutting forging blanks from round rolled bar stock. This can be done with a shear, with a cold cutting saw or with a gang saw. For the last named the bars are first sheared or cut to say 46⅞ in. in length, and from this stock nine blanks of 4⅞ in. length—for 18-lb. shrapnel—can be cut in multiple, allowing ⅜ in. for the kerf wasted in sawing, which would be the extreme. The use of thinner saws, down to say 5/32 in. blades as successfuly practised, will effect an appreciable economy in stock. Waste at this point can, of course, be altogether eliminated by shearing.

In Germany, where every detail has ben absolutely standardized, it is the custom to deliver blanks sheared to size directly from the mill. Under American conditons, however, the greatest aggregate saving in time, power and labor for the ordinary shop is brought about by a special gang-sawing rig served by the table of a heavy, rigid reciprocating tool, such as an open-side planer or slab miller. Jigs on this table can be set in multiple, so that those immediately in front of the saws are always loaded, and the only time lost is during the brief period of table return. This makes the operation practically continuous throughout the working shift. Indeed, there need be no stopping even between shifts or for meals, as the slight attendance necessary can easily be arranged for. One rig will thus be able to supply several forging and machining units.

THE SO-CALLED FORGING OPERATIONS

The sawed or sheared blanks are next thrown upon a conveyor or set vertically on shop trucks, preferably in rough wooden racks, and taken to the forging presses. This word forging is a misnomer, but one generally used for convenience. The first operation of piercing can be effected by any kind of a press capable of holding the blank in place and forcing a suitable punch down through its core to the pre-determined point of knockout. The second operation, or set of operations, for which either a horizontal forging machine of the general bulldozer type or a hydraulic press can be utilized, is essentially drawing and forming. The difference lies principally in a reversal of parts of the process. With a bulldozer the required base thickness is finally secured and the bottom formed at the end of the finishing punch stroke, while with the hydraulic press this is effected simultaneously with the drawing. The number of heatings and plunger strokes necessary and the number of drawing dies required are naturally determined by the type, power and operating speed of the press, the last-named being also influenced largely by the skill of the operator, who soon acquires great facility for the work. Beginning with the piercing of the blank, the operations necessary for the finished "forging" range from three to six or seven, according to the class or classes of equipment used.

The most economical work can undoubtedly be done on a special piercing, forming and short-drawing press, such as government arsenals the world over have long used for producing blanks for projectile cases—a press in which the various operations are effected by means of forming dies clamped to the working surfaces of the movable and stationary platens. These presses commonly have effective pressures of 150, 200, 250, 300, 350, 400, 450 and 500 tons, with some intermediate, at 1500 lb. water pressure per square inch.

An operation with two such presses working in tandem may be epitomized as follows: 1. Placing the hot blank in a die under the piercing punch. 2. Descent of movable platen and punch until knockout is reached. 3. Ejection of blank as a cup, which is then reheated for the second part of the process. 4. Scaling. 5. Placing cup, closed end down, on base-forming die in second press. 6. Automatic stop as base is formed. 7. Removal of first die and throwing out stop. 8. Completion of stroke through three drawing and forming dies. 9. Reversing ram and stripping shell from punch; return of press to first position.

In this process the quality of the steel is materially improved. The press exerts a continuous pressure which increases relatively as the sides of the cup diminish in thickness, and the mass of the drawn material flows under compression, making it denser and more homogeneous. On this account it is important to heat the cupped blank to a temperature which will be just sufficient (after scaling by means of a water jet, striking and brushing inside and out) to give the right fluidity. This is reached at a furnace temperature of not to exceed 1000 deg. C. for the second operation, as compared with somewhat more than 1100 deg., say 1130, for the first. The critical point or limit, which will vary with operating conditions, facility of the workmen for quick handling of the equipment and ma-

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terial, etc., can best be determined by tests made in each shop. The maintenance of steady even pressure is also a matter of the first importance, and good work cannot be expected of presses if they are operated by faulty pumps or unreliable steam supply or controlled by a system with defective piping, valves and flanges. Hence, these subsidiary details must be carefully looked to. The more positive acting and elastic steam accumulator has, in this connection, advantages over the weighted accumulator.

THE USE OF HYDRAULIC MACHINERY

A substitute for the vertical press described is the hydraulic push-bench, which has also been utilized for cupping and short-drawing operations in shrapnel making, as a similar extruding press has for work on high-explosive shell cases to be described later.

Piercing and drawing presses can be made with multiple plungers and die seats, so as to take two or more blanks or cups for forming and drawing at one time. With these a better balance can also be maintained. The handling of the stops and strippers by hand is permissible where the facilities provided do not include automatic appliances for this purpose, but it takes very skilled operators, and such appliances should be added wherever possible. Their pneumatic operation is advisable. For the dies and punches a grade of self-hardening, heat-resisting steel equivalent to the well-known Crescent No. 2 or Halcomb low-carbon tungsten alloy for hot work tools will give good satisfaction, although for the dies chilled white iron has been found quite acceptable. The press platens commonly used are heavy cored castings with low tension and compression strains.

USE OF DROP AND OTHER HAMMERS

An advantage of the hydraulic press over any apparatus which can be substituted, as described below, lies in the fact that a single drawing and forming operation through a set of dies suffices for all except the piercing or cupping, thus completing the shell case forging; while with other equipment there is a distinct operation and a separate machine or holder for each die. There is also an obvious benefit from forming simultaneous with drawing, as the strains set up in the molecular structure are lessened and the subsequent heat treatment is more effective.

Where hydraulic presses are not available, however, the work can be done by a series of simple up-setting and piercing operations with a steam hammer, drop-forge or powerful motor-driven punch press (anything exerting a blow or pressure of 4000 to 5000 lb. or over), followed by drawing with the punches and dies of a bulldozer or other power-operated forging machine. The first operation consists of heating the blank—unless sheared hot from the bar—and reducing it to a thick, squat shape by hammering it on an anvil, then forcing it down on an anvil-supported piercing die.

The cup, hot or heated, is next inverted on the first bulldozer or other forging machine punch and forced into a die which partially forms the base, at the same time being lengthened by drawing. After heating again, as a rule, it undergoes a similar process with the die next in order, which completes the rounding-off of the base. The final drawing, with a third die, then takes place, and the shell bottom is pressed flat, the body being formed to the right diameters, inside and out, for machining.

From the above it will be seen that the entire process, with whatever equipment carried out, is very simple. Nevertheless, it is one requiring more than ordinary precautions if rejections of work are not to be expected. Alignment and rigidity of every machine part, as well as taking up the wear and adjustment of the punches, dies, etc., are factors needing constant attention. Lubrication of all parts, including the punches and dies, and the use of suitable anti-scale compounds, also constitute important elements of success.

Until, however, the final machining and heat treatment, which is of vital importance because it fixes the limit of expansion of the shell when fired from the field-piece, there is no need for any shop man to consider the work specifically in relation to its ultimate use. All he has to do is to take a forging blank of a certain size, pierce it and draw it to a specified base and wall thickness. The length will take care of itself. Any measures he can adopt during the process to increase the density and toughness of the material are so much to the good and will not pass unappreciated; but, beyond turning out a product that is fully equal to specifications and can be machined properly, he is not called upon to pay any attention to the purpose of the work. The hardness strictly required in the final inspection results entirely from heat treatment and has little

What Some of the Material Specifications Require

One of the French shell specifications puts these chemical limits on the steel: Carbon, 0.34 to 0.42 per cent; manganese, 0.55 to .75 per cent; silicon, 0.15 to 0.25 per cent; phosphorus, 0.03 to 0.08 per cent, and sulphur not more than 0.05 per cent. A British high-explosive shell specification puts the manganese limits at 0.4 to 1.0 per cent and fixes maximum limits as follows: Carbon, 0.55 per cent; nickel, 0.5 per cent; silicon, 0.3 per cent; sulphur, 0.05 per cent; phosphorus, 0.05 per cent and copper, 0.1 per cent.

In respect to physical qualities, the French specification for the shells demands a steel which will show a tensile strength of 78,210 to 92,430 lb. per square inch and 18 per cent elongation after heating to 1652 deg. Fahr. and slow cooling and 106,650 to 147,900 lb. per square inch and 8 per cent elongation after heating to 1562 deg. Fahr., quenching in water and then drawing 15 min. in a lead bath at 980 deg. Fahr. A British specification for high-explosive shells stipulates steel from ingots from which there has been a 20 per cent discard (as against 40 per cent recently obtaining) and a yield point of 42,500 lb. per square inch, a breaking point of 78,000 to 110,000 lb. and elongation of 17 per cent. The United States requirements were given in THE IRON AGE of Aug. 12.

in common with the physical properties influenced by forging. It is determined by Brinell or scleroscope tests.

SPEED OF PRODUCTION

Speeding up the work can be accomplished more by eliminating any loss of time between the various operating stages than by increasing the speed of any of the machines used, as anything beyond ordinary good practice is likely to spoil the work. Among the causes of the latter are getting the punches too much heated and bent and both the punches and dies upset or edged enough—even though only slightly—to make the work inaccurate. None of these difficulties can be avoided altogether, so that frequent replacements are necessary; but they can be minimized by careful and moderately rapid operation.

With two special piercing, forming and drawing presses of say 400 tons each, a minimum production of sixty shells per hour ought to be maintained, and that has been considerably bettered on the American continent as well as in France and Italy. English shops appear to be satisfied, as a rule, with thirty to forty shells per hour. This was also the case in Germany, Austria and Scandinavian countries before the war, at the time the writer was permitted to see some typical operations; but, according to latest reports, they have recently gone the limit. Burst shrapnel cases fired from German and Austrian field guns, picked up on European battlefields and brought to this country, show a structure which would indicate very hurried forging and rather superficial heat treatment. Taking the American minimum, the above means 450 to 500 shells for each 7½-hr. shift, or something approaching 1500 shells daily for continuous three-shift operation for each two-press unit of production. This, however, can only be maintained by having at least one unit available for relief of the others, by changing about and giving each a periodical rest. The use of substitute machines for regular shell presses, such as hammers for piercing and cupping and bulldozers for forming and drawing will cut the production down about one-third to one-half for each unit.

GENERAL WORKING CONDITIONS

Any standard gas or oil-fired reheating furnace of sufficient capacity, with the proper pyrometer equipment, is suitable to put the blanks in condition for the first operation and the cups for the second. The presses should be placed as close as possible to them, so that there will be no appreciable loss of heat in transferring, and all tongs used must be kept in first-class condition, to avoid any fumbling. A desirable adjunct to each furnace used is an economizer shield over the working opening which recovers a large percentage of the heat ordinarily wasted and at the same time affords protection to all of the operators in the immediate vicinity. The spent gases discharged from the working opening are deflected by the blast and away from the men in the shop, against the tubes and heaters of the economizer through which the air for furnace combustion is circulated. This was described in THE IRON AGE of June 17, page 1340.

Between the cup-heating furnace and the press it is advisable to place water jets for use in scaling and revolving metal brushes or burrs for cleaning.

The working shifts ought to be made short, with rests and good food and drink for the operators in between; as the heat, the quick movements required and the strained attention which must be given to each operation soon put a man out of the condition essential to the best work. Frequent relief pays far more in results than the extra labor cost amounts to. Good lighting and an exhaust-fan system to keep the air clear of smoke and dust are also an excellent investment.

CAST SHELLS RATHER THAN FORGED

In Europe a spirited discussion has recently arisen which is likely to be heard from officially before long in the United States and Canada, viz.: whether forging is an absolute necessity for shrapnel or if, on the other hand, a shell case cannot be cast in its approximate final form and require no further operation to finish it than machining and heat treatment, even nosing being provided for in the mold. In practice it has been proved at the arsenals in Trubia, Spain, Genoa, Italy, and elsewhere that projectile steel derives the physical and mechanical properties required of it—allowing for the basic chemical composition—from its eventual heat treatment. If, therefore, the steel founder can be relied upon to produce a sufficiently sound metal some prominent European experts maintain that forging can be dispensed with. In that case, however, reheating for the purpose of annealing will still be indispensable. Where steel has been cast, annealing has the effect of restoring the molecular equilibrium that has been destroyed by the unequal cooling of the metal in the mold, and this process puts the shell case in good condition to undergo the subsequent heat treatment. During the Russo-Japanese war cast-steel shrapnel cases were made for the respective belligerents in Sweden and Japan, and lately they have been used by the French; but all of these appear to have been emergency measures and not based upon any deliberate policy. Such a policy for the future has not been definitely settled.

In conclusion it may be said that the production of hollow steel cylinders with one end solid, by means of a piercing, forming and short-drawing process, especially for small diameters, is essentially a specialized job and can best be handled in a shop equipped and trained for the work. Hence, unless there is reason to keep certain presses or hammers busy, the average plant which takes a contract to machine shells will do well to obtain its forgings from some reliable source of supply, if possible, rather than go to the expense and uncertainty of putting in new equipment and training men for the work above described. Plants already suitably equipped can, on the other hand, so organize their facilities as to turn out a maximum heretofore unthought of. The means of machining and finishing projectile shells far exceed the possible capacity of existing forge shops, and the great demand is for the work of the latter. Hence, one of the best results of the period through which we are now passing will be to put general forging operations on a plane of manufacturing efficiency which only drop-forging shops and a few large, highly specialized plants for drawing, forming, etc., have known. In this there are possibilities for increased economy of production which will not be lost sight of by managers of American and Canadian plants when the industries of peace again hold full sway.

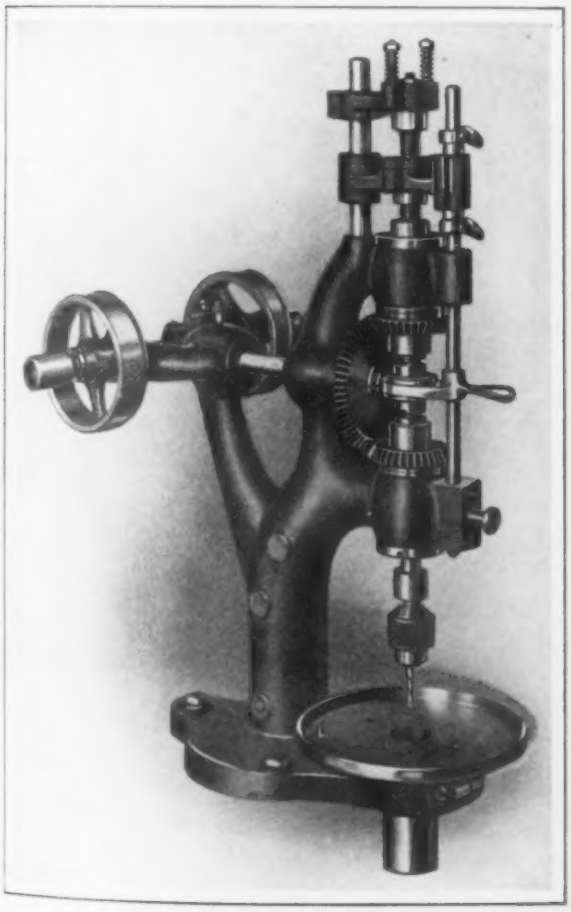
The Thomas Iron Company, Easton, Pa., has made arrangements with the export commission firm of Hay & Sossidi of New York and Easton, Pa., to sell its Thomas-Vanadium pig iron in Greece and the Balkan States. Hay & Sossidi will have their main office in Salonica, Greece, and branch offices in the different Balkan States.

Tapping and Countersinking Machine

A new automatic tapping and countersinking machine for bench work for tapping either blind or through holes up to ¼ in. in diameter has been brought out by the Poese Machinery & Mfg. Company, Commercial Building, Cleveland, Ohio. This machine is claimed to be especially adapted for light tapping and countersinking as it taps and reverses automatically, doing away with both hand and foot levers and allowing the operator free use of both hands to handle the work. It is pointed out that one of the special uses to which the machine can be put to advantage is tapping the holes on the sides of shrapnel noses.

The spindle is set in motion by drawing out a plug in front of the shifting rod, as shown in the illustration and inserting it in a vertical slot, which allows the engagement of clutches on the spindle. When the hole is tapped to the predetermined depth the machine reverses automatically and the operations are repeated. By changing the plug to its former position the spindle can be stopped at any height desired. The spindle travel is regulated by adjusting the two collars at the top of the shifting rod so that the depth of the thread can be quickly changed. The difference in the pitch of the tap is taken up by a compensator at the top of the spindle. The machine is provided with a friction clutch so that the tap will stop in case of an overload but the machine will continue to run and reverse as usual. A lever is provided on the shifting rod for reversing the machine by hand.

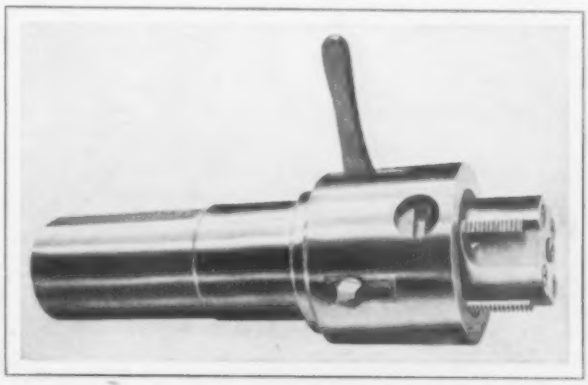
Two speeds are provided, the two pulleys on the driving shaft being belt driven from different sized pulleys on the lineshaft. The machine is driven from either pulley, one providing a speed of 300 r.p.m. and the other 500 r.p.m. The driving pulleys are engaged by spring clutches. The main spindle bearings are roller bearings and all other bearings have bronze bushings. The machine is of simple construction and is designed to combine durability, economy and rapidity of operation with accuracy, uniformity of work and saving of taps. The machine is 33 in. high. The clearance from the tap spindle to the column is 4½ in. The vertical adjustment of the table is 8 in., and the distance from the table to the bottom of the spindle is 8 in. The driving pulleys are 5 in. in diameter. Its net weight is 125 lb.



A Recent Automatic Tapping and Countersinking Machine for Holes up to ¼ In. in Diameter

A Collapsing Tap for Shrapnel Shells

The Victor Tool Company, Waynesboro, Pa., has designed a special type of collapsing tap for shrapnel shells. It may be used either in a turret head or attached to a live spindle. One of the points upon which special emphasis is laid is the adjustment provided for the tension of the throw-off or tripping spring.



A Collapsing Tap That Has Been Designed Especially for Shrapnel and High-Explosive Shell Work

The body of the tap is made of machinery steel while the chasers are of high-speed steel. It is emphasized that they are made very strong and will withstand the strain of threading shrapnel or high-explosive shells. The chasers are adjusted from the front by a hardened set screw having 32 threads per inch. In this way it is pointed out a fine, accurate and positive adjustment is secured and once the tap is set to size, it will stay without slipping. At the other end of the tap is a screw for adjusting the tension on the throw-off or tripping spring, this being a new feature. When the shell is tapped to the proper depth the tripping spring is actuated and the chasers are collapsed, permitting the withdrawal of the tap without injury to the work or the chasers.

Small Manganese Ore Imports

Manganese ore imports to the United States for the fiscal year ending June 30, 1915, were about 28.5 per cent less than those for the preceding fiscal year and 46.5 per cent less than those for the year ending June 30, 1913. For the year ending June 30, 1915, they were 206,859 gross tons, against 288,706 tons for the fiscal year 1914 and 387,196 tons for 1913. In June this year the imports were 31,011 tons, practically all from Brazil, against 22,461 tons from Russia, India and Brazil in June, 1914. Of the total receipts to June 30, 1915, 58,090 tons or 28.2 per cent were received in the period from Jan. 1 to July 1, 1915.

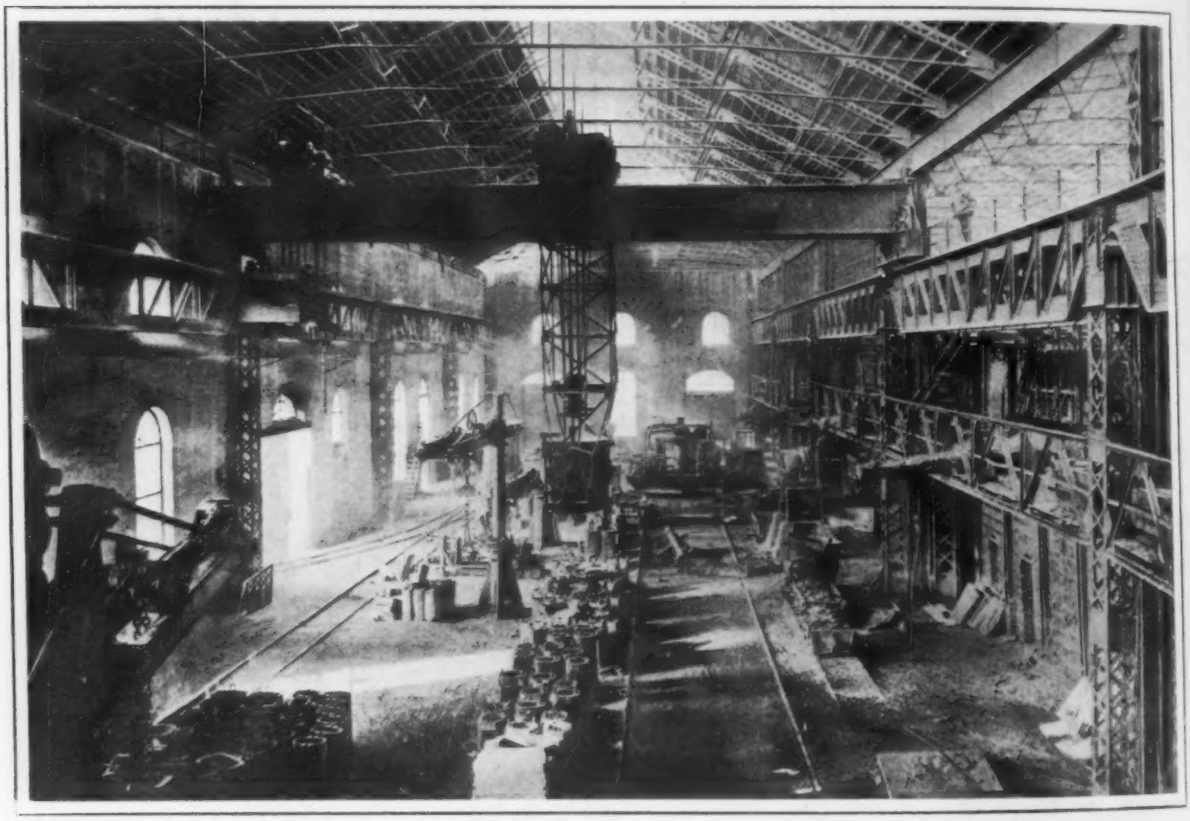
The Northern Iron Company's furnace at Port Henry, N. Y., which has been inactive since August, 1914, and meantime has been relined and repaired, was blown in last week.

Resicza Steel Works, a Likely War Goal

Iron, Steel and Munitions Manufacturing Plant in Southeastern Hungary—Regarded as Likely Storm Center if Balkans Join Allies

BY AN OCCASIONAL CONTRIBUTOR

The Resicza Steel Works in southeastern Hungary are regarded by military men as the coming storm center of immediate military operations in the event of the Balkan countries deciding to join forces with the Allies. The Resicza plant is located in the V formed by the frontier lines of Serbia and Roumania, and is directly in the fore front of any aggressive move of Roumanian or Bulgarian troops. The importance of Resicza as a great munitions manufacturing works, apart from its iron and steel and railroad equipment building facilities, cannot be overestimated. The plant is easily the first of its kind east of Vienna. Its relation to Hungary is that of Le Creusot to France and Krupp to Germany.



Pouring Side of Open-Hearth Furnaces of the Resicza Steel Works

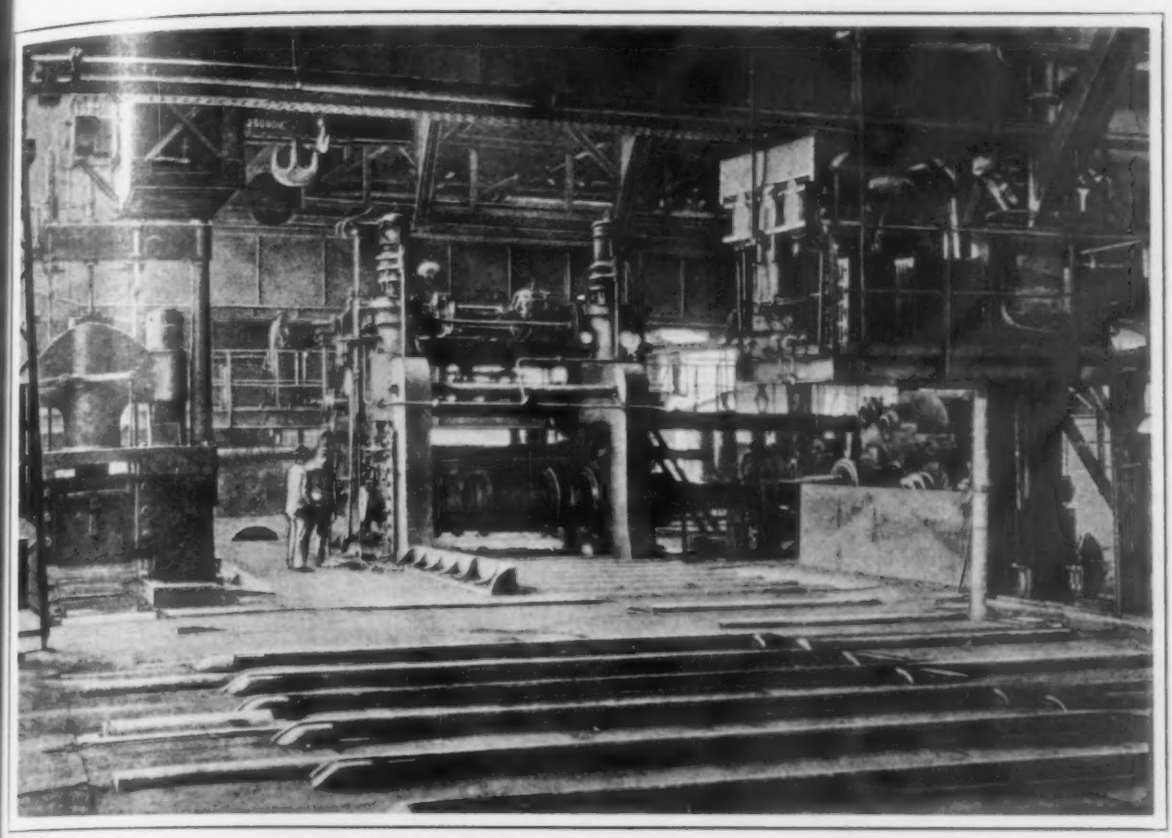
The possession of Resicza, it is contended in military circles, would be one of the immediate objectives of Balkan forces. There is not an iron or steel works worthy of the name to the southward of Resicza. At Galatz in Roumania there is a shipyard, and in Serbia a government small-arms plant, but Resicza represents the last available place for heavy guns and armor forgings after leaving Witkowitz in Moravia.

The report of the movements of strong forces of German-Austrian troops recently into southeastern Hungary may be taken to presage the determination to hold Resicza against any sudden onslaught. It also emphasizes that the initial operations will probably determine the fate of this great plant.

Under normal conditions there are between 6000 and 7000 men in the Resicza works proper, but the total force including the mines and employees of branch establishments approximates 18,000. The entire administration is under the direction of the privileged Austro-Hungarian State Railway Company.

The location of the steel works is in the mountains which line the northern bank of the Danube. The furnaces lie grouped in a valley, rock bound in its mountain fastness, and which is approached by a railroad coming from the direction of Vojtek. The country just behind Resicza is the termination of one of the most wonderful stretches of farming land to be found in all Europe. From Budapest to Temesvar, thence to Vojtek, one sees in harvest time waving fields of grain as far as the eye can reach. The land there is comparable with the great corn acreage of Kansas and Nebraska. It is this territory that Germany and Austria have the facilities for drawing upon.

To reach Resicza one must traverse the wide grain belt, then climb through the foot hills up to the level of the Resicza valley. The Resicza buildings were acquired by the Austro-Hungarian State Railway from the Austrian Government in 1855. The sale comprised about 330,000 acres of land. Within this great holding are numerous mines and all the essentials for the making of iron and steel, with some nickel and chrome for special mixtures. Close to the iron mines are great lime deposits,

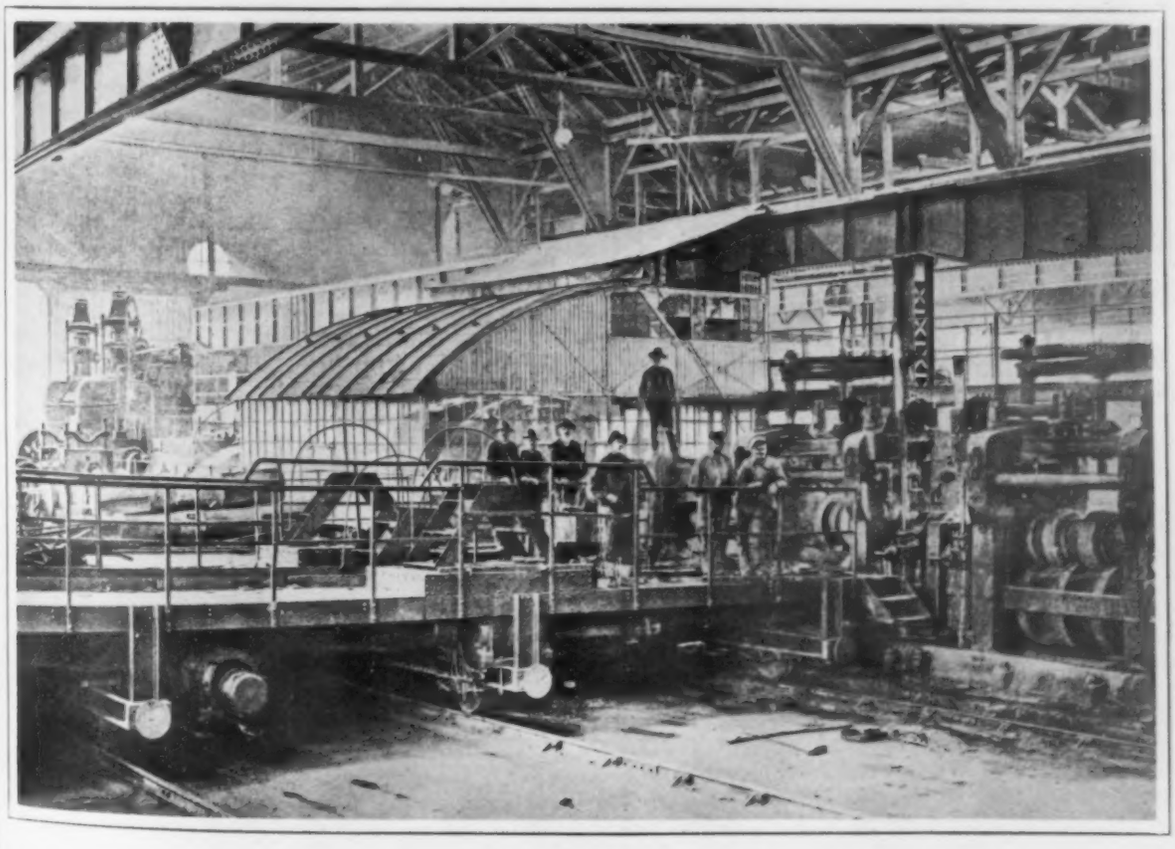


The Blooming Mill and Bloom Shear

while the clay at Resicza is probably unexcelled anywhere for the manufacture of brick. The supply of iron ore in the vicinity of Resicza is seemingly inexhaustible.

Resicza is essentially a steel-making plant, but it also undertakes large orders in turning out steel rails, bridge equipment, gas engines and ordnance work of great variety. The annual production of steel under normal conditions is about 100,000 tons, the greater part of which is produced by the Siemens-Martin open-hearth process. About 25,000 tons of Bessemer steel is produced annually from three converters. The pig-iron output approximates 110,000 tons annually. A recently installed blast furnace is of Pittsburgh design.

Resicza makes extensive use of blast-furnace



The Rail and Structural Mill

gas, and has been doing so for the past 35 years. A large proportion of the power furnished comes from gas engines. Both blast-furnace and producer gas are used. The Kerpely gas producer is employed. The electric generators in service were all built at Vienna, while Long of Budapest has built all the engines.

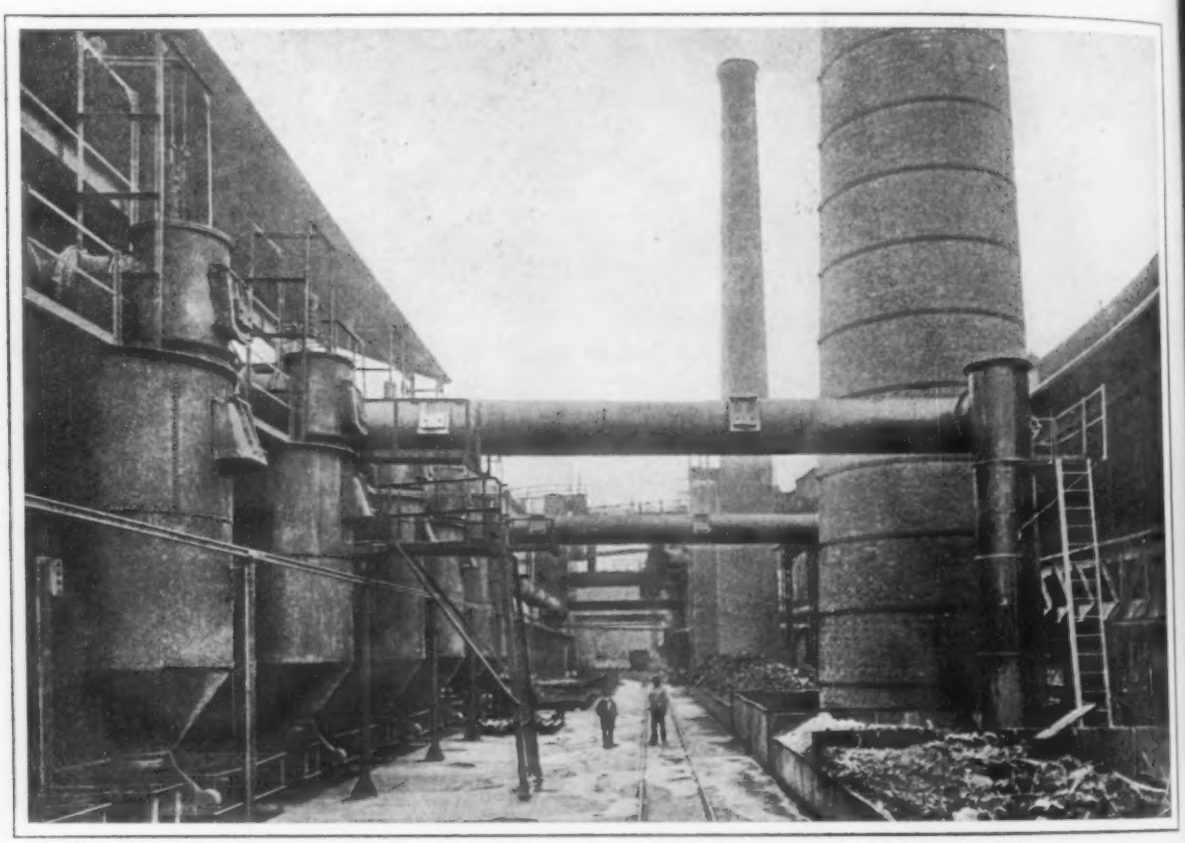
The blooming mill is electrically driven. The diameter of the largest roll is 1 meter and the ratio of gears is one to two. The two motors yield 2000 effective horsepower, and give 10,000 hp. through the help of a fly wheel after the Ilgner system. In the finishing department are a plate mill and a 3-high rail mill of three stands of rolls. There is also a special tire mill where the work turned out is probably as fine as can be found anywhere in Europe. Resicza is the only source in Hungary for steel tires for railroad wheels. All the high-speed equipment used on Hungarian railroads comes from Resicza.

Not far from Resicza is Anina where the Resicza administration has important mines and an iron foundry for general castings. Anina is about fourteen miles to the southward of Resicza and may be said to be a complete plant in itself. There are a blast-furnace installation, a very large coal warehouse system and complete works for making screws and bolts. A little to the west of Anina the Resicza company possesses a complete flour mill installation. This latter is at Oraviczabanya. At Roman-Bogsan, in the same district, the Resicza directors undertake to turn out agricultural implements.

The best coal in Hungary is reputed to come from Anina. About 15,000 tons of charcoal is produced annually for the Resicza works. The charcoal plant also produces wood alcohol which is sold for the most part to German dyeworks. The alcohol capacity is 845 quarts per day. The coal mined in Anina is especially suitable for coke. There is an annual output of about 300,000 tons of this variety of coal. At Resicza there are 60 ovens and at Anina there are 84 ovens for the production of coke.

The ordnance work at Resicza comprises field and siege guns, armor plates for gun positions, projectiles and transport wagons. Ordinarily Resicza employs 1400 men in the machine-tool department. Practically all the work in the machine shops is paid for on the piece-work basis.

The Resicza and Anina rolling mills turn out on an average about 100,000 tons of rolled products yearly. Of this quantity about 25 per cent is rails, 10 per cent plates, 5 per cent hoops, 20 per cent girders and 40 per cent various other kinds of finished material.



The Gas Producer Plant

The machine and forging shops combined afford a yearly output of about 10,000 tons of material, consisting in the main of railroad carwheels, mounted on axles, steel forgings, rough and machined, and steel castings. The nail and screw factory at Anina produces about 2500 tons of finished nails and screws annually.

The flour mills at Oravicza and Bogsan are turning out about 10,000 tons of flour annually, while the cement works at the former place yield about 2500 tons of cement.

Such, briefly, are a part of the productive features of the Resicza district and which make its possession of paramount importance in any struggle between the German-Austro forces and those of the Balkan states.

The Wellman-Seaver-Morgan Company, Cleveland, Ohio, will shortly begin the erection of two Hulett ore unloading machines at Constable Hook, in New York harbor, orders for which were placed some months ago. These machines will be installed for the Bethlehem Steel Company on the Lehigh Valley docks. It is not expected that the plant will be ready for operation before next spring.

A Recent High-Speed Hack Saw Machine

The Massachusetts Saw Works, Springfield, Mass., have recently placed on the market a high-speed hack saw machine for handling all metals up to 9 in. square in any of the ordinary lengths. It has a shock absorber, an extension frame, a patent swivel-jawed vise and an automatic patent lift.

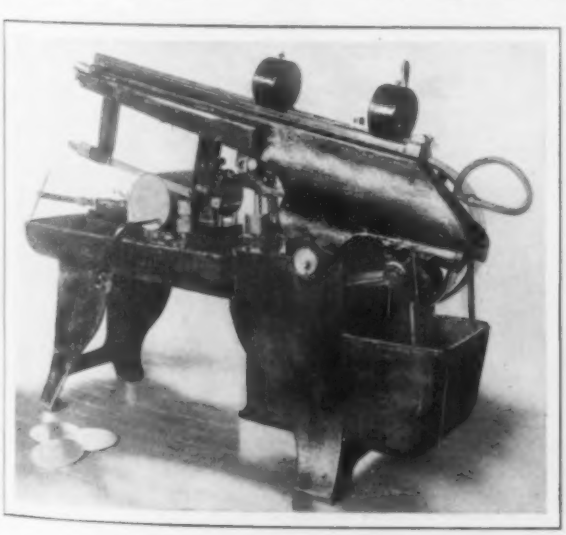
The machine is set low on a solid foundation with wide spread legs to provide rigidity and steadiness. A large pan for suds surrounds the bed and contains a 9-gal. tank divided and screened for chips. The tank, the pan, the bed and the legs all form a single casting. The power section or head of the machine swings on a shaft center, an arrangement which is relied upon to give a steady, silent motion with but little wear and to secure a full length stroke of the blade at any angle. The bearings have, as far as possible, been made heavy and wide throughout the machine and readily accessible arrangements for taking up the wear are provided.

Two speeds for the saw blade are provided, the change being made by shifting the starting lever on the back of the machine to engage one or the other of the pulleys mounted on the driving shaft. The speeds recommended are 65 strokes for hard metals and 130 for the softer ones, the speed range being obtained by using pulleys of different diameters on the main shaft.

The descent of the blade is lever controlled and cushioned. The vertical movement of the blade may be stopped at any point and a shock absorbing device permits the blade to engage the material gently, it being emphasized that there is no danger of breaking or stripping teeth regardless of the point from which the frame is started to drop. On the completion of the cut the machine stops, an oil dashpot under the bed acting as a cushion. The extension frame will hold blades ranging from 12 to 17 in. in length. To vary the length of the frame, it is simply necessary to push a button which releases the locking mechanism and pull the frame out as far as may be desired after which the blade is inserted without any other manipulation. An automatic patent lift which will clear the stock irrespective of the position of the frame is included.

The patent swivel-jawed vise has a capacity of 9 in. and the rear jaw may be set at any angle up to 45 deg. in either direction. The front or sliding jaw will adjust itself to the angle of the fixed jaw or to an irregular surface. If desired, the vise may be advanced along the table of the machine to double the capacity of the blades on small work or it can be removed entirely and bolts and clamps substituted when necessary.

A rotary pump with a double check valve delivers cutting solution on the blade as soon as the machine starts. The lubricating system has received particular attention and includes oil cups, waste boxes and holes for every bearing or working point.



A Recently Developed High-Speed Hack Saw Machine for Cutting All Kinds of Material Up to 9 In. Square

Mechanic's Pressed Steel Work Cabinet

A recent addition to the line of steel shop accessories built by the Berger Mfg. Company, Canton, Ohio, is a pressed steel work cabinet. It is designed to provide storage facilities for special dies, tools, blueprints, etc., as well as a place for laying out work or handling heavy parts without taking up valuable floor space.

A Special Pressed Steel Cabinet That Has Been Developed to Provide Facilities for Storing Special Dies, Tools, Blueprints, Etc., and for Laying Out Work or Handling Heavy Parts

The cabinets are made of formed sheet steel and are divided into two compartments with individual locks. In this way it is possible for a mechanic and his helper to share a cabinet, each having his own individual compartment. It is pointed out that this arrangement is also advantageous where both day and night shifts are employed and a machine is operated by one man in the day time and another at night. The top has been made solid and rigid to enable it to be used for laying out work or handling heavy parts, while the height is such that the cabinet will fit under the machine or at the end where it is out of the way when it is not desired to use the top.

Equipment Orders This Year

The total number of cars ordered last month up to Aug. 24 was 4025, against 5675 in July and 50,074 in May and June. The total for the year to Aug. 24 is 71,616, which compares with only 80,000 in the year 1914, and 147,000 in 1913.

Locomotives ordered up to the last week in August total about 1000 for this year, but over half of these are for export. For the first three weeks of August 119 are reported. Locomotive construction in the past has run above 5000 in good years. In 1907 the total for the United States and Canada was 7362.

The J. I. Case Threshing Machine Company, Racine, Wis., has instituted a pension system. The notice issued to employees says that all will be entitled to a pension on reaching the age of sixty-five, and that at the age of seventy retirement on pension will be compulsory. The pension is to be based on 1 per cent of the wages for each year employed, so that an employee who has been with the company for twenty years will then receive 20 per cent of his annual wages. The plan is made effective as of July 1, 1915, and twenty aged employees are retired at once. The company employs in excess of 4000 men. The maximum pension permitted under the system is $50 per month, and the minimum is $18.

Welfare Work in a Steel Foundry

A New Building Erected by the Reading Steel Casting Company and Devoted to the Relief Association of Its Employees

To see employees emerge from a steel foundry appearing as though they had done anything but a day's hard work amid heat and dust and alongside dirty machinery is not usual. This possibility is afforded the employees of the Reading Steel Casting Company, Reading, Pa., which has recently erected and opened a welfare building for its workers at a cost of more than $12,000. The building is located adjoining the plant of the company and is the headquarters of the Reading Steel Casting Relief Association.

Several employees of the company formed a relief association on Aug. 10, 1910. Previous to this it had been the custom to take a collection for a fellow workman who was reduced in circumstances by accident or sickness or otherwise. The association gained in favor and membership until to-day every employee of the 230 to 250 men belongs to it. Some time after the organization of this association headquarters were established in a small frame building on the company's property. New headquarters were started last fall by the company, and the building, shown in an illustration, was completed recently.

The new welfare building is believed to be the only one of its kind in that part of Pennsylvania. The basement contains 290 lockers, five shower baths and twenty-eight stationary washstands and toilets, a view of part of these being shown by another illustration. These are used by nearly every employee morning and night. The baths have hot and cold water, the supply of the former being copious, coming from a large boiler and heating plant in the building.

An emergency hospital, equipped with a large medicine closet and first-aid appliances, is located to the right of the main entrance on the first floor. Temporary relief is administered here to extreme cases, while injuries of a less serious nature are also attended to. To the left of the entrance is an office for officers of the association, as well as a store. Cigars, tobacco and candy are sold here, as well as workmen's gloves and other articles for the convenience of employees. A well-aired reading and writing room is also found on this floor and a billiard and pool room. A kitchen takes up the remainder of the space and is used to prepare luncheons. The second floor is completely absorbed

A View of Part of the Wash Stands, Lockers and Shower Baths in the New Welfare Building of the Reading Steel Casting Company

by a large assembly room. The wood finishing of the interior is green, while the heating and lighting plant is complete and modern. Flower beds and shrubbery have been planted on the lawn around the building.

A result of this undertaking by the company is declared already to be a unifying of the whole organization into a more co-operative group, as well as the promotion of greater sociability. The building is regarded and used as a home in the evening as well as in the day time. Sociable games and reunions are a feature of the evenings. The presence or use of liquor is entirely prohibited, and a physical, moral and social improvement among the men is declared already evident.

The dues of the relief association are 50 cents per month. The benefits are $5 per week for injuries or illness, but in the case of sickness nothing is paid the first week. Death benefits are $25. Officers of the association are: William Schwambach, president; Roy Boyer, vice-president; H. M. Doty, treasurer; Harry Van Pelt and Albert Schmehl, recording and financial secretaries respectively.

The New Welfare Building of the Reading Steel Casting Relief Association

India's Manganese Ore Exports Small

Indian manganese ore exports continue to be seriously affected by the war. The total for May, 1915, was only 21,952 gross tons as compared with 71,849 tons in May, 1914, a decrease of 69 per cent. The May shipments this year were distributed as follows: United Kingdom, 18,303 tons; France, 2000 tons, and Italy 1650 tons. Of the exports in May, 1914, the United Kingdom received 18,832 tons; Germany, 4400 tons; Belgium, 17,450 tons; France, 14,850 tons; Austria, 4030 tons; Japan, 1429 tons, and the United States 10,858 tons.

Larger Imports of Ferrosilicon

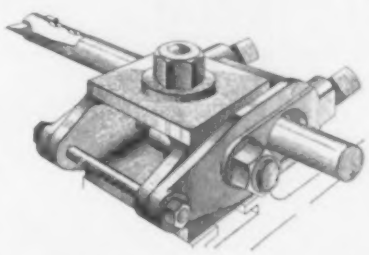
Imports of high-grade ferrosilicon for the year ending June 30, 1915, were 6608 gross tons, which compares with 3296 tons for the first half of 1914 and 6146 tons for the calendar year 1914. This puts the imports for the first half of 1915 at 3312 tons. The June imports were 386 tons, against 424 tons in June, 1914.

Three vessels from Brazil, carrying manganese ore, recently arrived in Baltimore in one day. The total amounted to 13,700 tons.

The Solid Drawn Forging Company, New Castle, Pa., has been incorporated to deal in iron and steel products.

A Special System of Boring Tools

The Rigid Tool Holder Company, Baltimore, Md., has recently placed on the market a system of boring tools. The tools are the invention of E. F. Gibbs, a mechanic in the Bureau of Engraving & Printing, Washington, D. C., who developed them for his own use. They consist of a special lathe boring bar, which is made in ten sizes and four types of holders to meet various local conditions, a special cutting-off tool and internal and external threading tools.



A Special Adjustable Boring Tool for Lathes Using Inserted Steel Cutters

The adjustable boring tool, which is the one illustrated, can be used with any lathe having a swing of more than 12 in., although an elevating liner may be required on some of the larger sizes. The base is square and broad, the tool post is eliminated and the king bolt passes through the clamping bolt, a combination which tends toward rigidity. The swiveling elevating yoke which carries the boring bar can be adjusted between approximate elevations of from 1 7/16 to 2⅛ in. and the bar is locked in position by the clamping of the yoke. The clamp at the end of the bar which holds the cutter has its power materially increased by the screw which is farther away from the cutter. This clamping mechanism, it is emphasized, does not materially alter the exterior of the bar and no special wrench is required for fastening the cutter in place. The cutter will not dig in in boring or loosen in turning and it is possible to regrind the cutters and use them until they are quite short.

Other tools are single and double reversible boring tools, which as their name indicates can be turned. The double reversible tool has a one-piece steel holder and will reverse either end for end or upside down. Thus four elevations for the bar ranging from 1⅜ to 1¾ in. are obtained, the difference between any two successive ones being ⅛ in. The single reversible tool has a one-piece holder and is designed for use on but two lathes, as it can only be turned upside down. A tool post boring tool, which has a one-piece holder with an angular opening between the shank and barrel, is also made. This opening is relied upon to bring the cutter point which receives the strain as close as possible to the supporting tool post wedge, while the angularity of the opening throws the cutter point directly in front of the wedge. The cutting-off tool is designed as a substitute for the customary right, left and straightway cutting-off tools. The internal threading tool is a modification of the tool post boring tool and the one for cutting external threads is of the gooseneck type.

The Erie Railroad has ordered five locomotives from the American Locomotive Company, and the Atlantic Coast Line and the Nashville, Chattanooga and St. Louis ten each from the Baldwin Locomotive Works. The Pennsylvania Railroad will at once commence the construction at its Altoona shops of the ninety-four locomotives called for in its 1915 program; of these twenty-six are to be freight and sixty-eight switching engines. The Servian Government is reported to have ordered fifteen Pacific type locomotives from the American Locomotive Company.

The X-Ray in Metallurgical Research

Range of Its Application as to Thickness of Steel and Size of Blowholes—The Technique Illustrated by Actual Photographs

Recent developments in the application of the X-ray to the metallurgical examination of metals have been given in two articles in THE IRON AGE, one in the issue of Jan. 21, 1915, and the other in that of March 4, 1915. The first showed how defects and blowholes had been detected in steel castings and the other the application of the process to the examination of brass and copper castings.

In a paper entitled "Radiography of Metals," to be presented at the September meetings of the American Institute of Mining Engineers and of the American Electrochemical Society in San Francisco, Cal., the originator of this new method of research, Dr. Wheeler P. Davy, of the research laboratory of the General Electric Company, Schenectady, N. Y., gives the results of further investigations in the examination of steel. An abstract of his important work is as follows:

Since the previous articles have been written it has seemed desirable:

1. To obtain data from which the exposures necessary for any thickness of steel could be at once calculated.

2. To find the thickness of the smallest air inclusion which could be radiographed in a given thickness of steel.

3. To find the direction from which to hope for further progress.

4. To find the technique of radiographing metals.

THICKNESS OF STEEL PENETRABLE

In order to gain some preliminary data, several pieces of ½-in. (12.6 mm.) boiler plate were obtained, 5 x 7 in. (12.5 x 17.5 cm.) in size. In one of these, holes were drilled in such a way that the

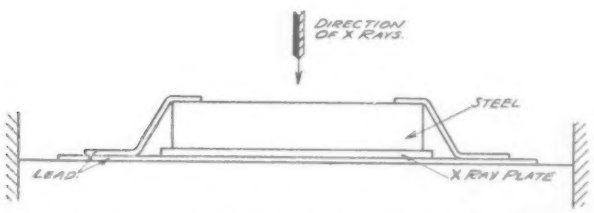


Fig. 1—Diagram of the Method of Preparing Steel Sample, X-Ray Plate, Lead Mask and Lead Backing for Taking Radiograph

axis of each hole was midway between the faces of the steel and parallel to those faces. The diameters of these holes were as follows:

Hole Number	Diameter
1	¼ in. = 6.3 mm.
2	⅛ in. = 3.1 mm.
3	1/16 in. = 1.6 mm.
4	1/32 in. = 0.8 mm.
5	1/64 in. = 0.4 mm.

Exposures were made on Seed X-ray plates at 20 in. (50 cm.) distance with Coolidge tube X-117 operated on Sheidel-Western induction coil with mercury turbine break. The X-ray plate was placed on a sheet of ⅛-in. (3.1 mm.) lead. The steel was placed above this and a lead cover was placed over the whole in such a manner that the cover and backing made a complete lead shield for the X-ray plate, as shown in Fig. 1. A rectangular hole in the cover allowed such X-rays as were able to penetrate the steel to reach the X-ray plate. This afforded complete protection against secondary rays. Without such precautions, the effect on the X-ray plate of secondary rays would have been greater than that of the rays used to take the picture. If the steel had been 2 or 3 ft. (60 or 90 cm.) square, such precautions would have been unnecessary. By placing the pieces of boiler plate on top of one another, any thickness of steel desired could be obtained. Exposures were made at 11, 13 and 15 in. (27.5, 32.5, 37.5 cm.) parallel spark gap between points. An attempt was made to use a 17-in. (42.5-cm.) spark gap, but was abandoned on account of flashing in the tube. Results are tabulated below:

Thickness of Steel	Plate	Spark Gap In.	Spark Gap Cm.	Exposure in MA-Min.	Holes Visible
½ in.	D	11	27.5	7	1–2–3–4–5
(12.5 mm.)	A	13	32.5	4	1–2–3–4–5
	B	15	37.5	2	1–2–3–4–5
1 in.	E	11	27.5	45	1–2–3–4–5
(25 mm.)	F	13	32.5	19	1–2–3–4–5
	G	15	37.5	10	1–2–3–4–5
1½ in.	H	11	27.5	45	1–2–3 very faint
(37.5 mm.)	I	13	32.5	30	1–2–3 very faint
	K	13	32.5	90	1–2–3 faint
	J	15	37.5	30	1–2–3–4–5 very faint
	L	15	37.5	60	1–2–3–4–5 faint

This really means, of course, that at 13-in. (32.5-cm.) spark gap 90 milliampere-minutes is sufficient to enable one to notice the difference in blackening between exposures through 1 7/16 and 1½ in. (36 and 37.5 mm.), but is not sufficient to enable one to detect the difference in blackening between exposures through 1 15/32 and 1½ in. (36.8 and 37.5 mm.) of steel.

The above results were necessarily incomplete, since the plates were by no means all of the same density. They served, however, to show two things:

1. With the voltages which can now be used, it is impracticable to radiograph through more than 1½ in. (37.5 mm.) of steel with tungsten target tubes because of the time required.

2. The use of high voltages does not seem to reduce appreciably the clearness of the picture obtained. (It was to have been expected from the published data on scattering in aluminum that enough scattered radiation would have been produced to blur the pictures, but plate B apparently shows as good detail as does Plate D.)

DATA OF A QUANTITATIVE NATURE

It remained to confirm the above conclusions with data of a quantitative nature. Seed X-ray plates were therefore exposed under the same conditions as before, except that none of the slabs of steel used had been drilled. For each thickness of steel, all the exposures at a given spark gap were made on the same plate. Each plate, then, showed a series of steps which increased in density from one end of the plate to the other. Thickness of steel, spark gap and milliampere-minutes were recorded on each plate by means of lead numbers. The following plates were thus exposed:

Plate No.	Thickness of Steel In.	Thickness of Steel Mm.	Spark Gap In.	Spark Gap Cm.
216	(*a*) ¼	12.5	11	27.5
217	(*b*) ½	12.5	13	32.5
218	(*b*) ½	12.5	15	37.5
221	(*c*) 1	25.0	11	27.5
220	(*c*) 1	25.0	13	32.5
219	(*c*) 1	25.0	15	37.5
222	(*d*) 1½	37.5	15	37.5

A study of these plates showed the following facts:

Let E_b be the exposure in milliampere-minutes necessary to produce a given darkening of the plate through ½ in. (12.5 mm.) of steel, and let E_c and E_d be the exposures necessary to produce the same darkening through 1 in. (25 mm.) and 1½ in. (37.5 mm.) respectively.

Then at 11-in. (27.5 cm.) gap, $E_b : E_c = 1 : 11$.

At 13-in. (32.5 cm.) gap, $E_b : E_c = 1 : 8$.

At 15-in. (37.5 cm.) gap, $E_b : E_c = E_c : E_d = 1 : 8$.

Also, through both ½ in. (12.5 mm.) and 1 in. (25 mm.) of steel,

E_{13}-in. (32.5 cm.) gap : E_{11}-in. (27.5 cm.) gap = 1 : 4

and

E_{15}-in. (37.5 cm.) gap : E_{13}-in. (32.5 cm.) gap = 2 : 3

It is at once evident that *either* X-rays from a tungsten target at 13-in. (32.5-cm.) gap are more penetrating than when produced at 11-in. (27.5-cm.) gap, or the X-ray plates used are more sensitive to the rays produced at 13-in. (32.5-cm.) gap. There is other evidence to show that the first of these conclusions is the more probable, but it is the *effect of the X-rays on the plate* which is of prime importance in this work, so that from a radiographic standpoint we may say in any case that the *effective penetration* of the rays is a little greater at 13-in. (32.5-cm.) than at 11-in. (27.5-cm.) gap.

In the same way we may conclude that the effective penetration at 15-in. (37.5-cm.) is the same as at 13-in. (32.5-cm.) gap. There is, however, a marked decrease in the amount of exposure required as the voltage across the tube (as measured by the spark gap) is increased. This may be due to one of two causes: *either* the efficiency of transformation from the kinetic energy of the cathode stream to the energy of the X-rays may be greater at the higher voltage, *or* there may be some peculiarity in the wave-form produced by the induction coil such that a great deal of energy is given off at a voltage corresponding to a 13-in. (32.5-cm.) gap when the coil is operated so as to give a maximum voltage corresponding to a 15-in. (37.5-cm.) gap.

FORMULAS FOR THE EXPOSURE NECESSARY

From the data at hand it is easily possible by well-known means to construct formulas for computing the exposure necessary for radiographing steel at various spark gaps.

Let Q_0 be the quantity of X-rays impinging on the steel during the exposure.

Let Q be the quantity of the rays which pass through the steel.

Let x be the thickness of the steel.

Let λ be the coefficient of absorption, and

Let ϵ be the base of natural logarithms.

Then if the X-rays are homogeneous,

$$Q = Q_0 \epsilon^{-\lambda x}$$

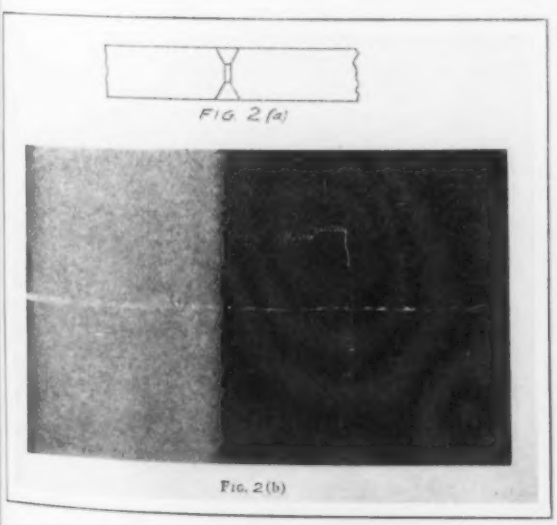


FIG. 2 (a)

FIG. 2 (b)

Figs. 2a and 2b.—Diagram of Section of the Weld in Sample No. 1 and a Radiograph of the Autogenous Weld in Steel Sample No. 1. Only the surfaces have been welded

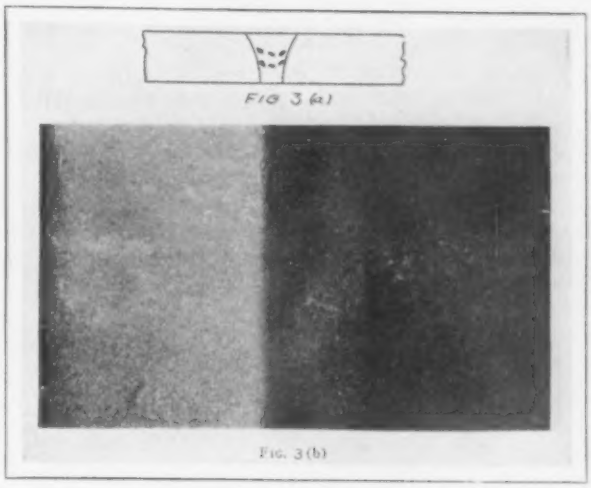


FIG. 3 (a)

FIG. 3 (b)

Figs. 3a and 3b.—Diagram of Section of Weld in Sample No. 2 and a Radiograph of the Autogenous Weld in Sample No. 2. Holes in the center due to metal not being entirely fused

Now at 15-in. (37.5-cm.) gap we know that

$$\frac{E_b}{E_c} = \frac{E_c}{E_d} = \tfrac{1}{8}.$$

The rays given off at 15-in. (37.5-cm.) gap are therefore practically homogeneous. Since $\frac{E_b}{E_c} = \frac{1}{8}$ at 13-in. (32.5-cm.) gap, we may assume that these rays are also practically homogeneous. Rays given off at 11-in. (27.5-cm.) gap are still sufficiently homogeneous, after having passed through the first few hundredths of an inch of steel, to permit their being treated as though they were actually homogeneous. Calculations for exposures at 11-in. (27.5-cm.) gap are to be considered as only good approximations.

For 15-in. (37.5-cm.) gap we have

$$Q/Q_0 = \tfrac{1}{8} = \epsilon^{-\lambda x} = \epsilon^{-\frac{1}{2}\lambda}$$
$$\log 8 = \tfrac{1}{2}\lambda = 2.079$$
$$\lambda = 4.16 \text{ in.}^{-1} = 1.64 \text{ cm.}^{-1}$$

Likewise for 13-in. (32.5-cm.) gap

$$\lambda = 4.16 \text{ in.}^{-1} = 1.64 \text{ cm.}^{-1}$$

Applying the same method for 11-in. (27.5-cm.) gap

$$\lambda = 4.80 \text{ in.}^{-1} = 1.89 \text{ cm.}^{-1}$$

Now at 15-in. (37.5-cm.) gap and 20 in. (50 cm.) distance 0.8 milliampere-minutes gives a good exposure through ½ in. (12.5 mm.) of steel. A corresponding darkening would have been produced on a bare plate by an exposure of 0.1 milliampere-minutes. This corresponds to Q in our formula. We may therefore write, since $Q_0 = E$,

$$0.1 = E \cdot \epsilon^{-4.16x}$$
$$10E = \epsilon^{4.16x}$$
$$\log_\epsilon 10E = 4.16x$$
$$\log_{10} 10E = 1.80x$$
$$E = 1/10 \log_{10^{-1}} 1.80x$$

where x is the thickness of the steel in inches or

$$E = 1/10 \log_{10^{-1}} 0.71x$$

where x is the thickness of the steel in centimeters.

The corresponding formulas for 13-in. (32.5-cm.) gap are

$$E = 3/20 \log_{10^{-1}} 1.80x \ (x \text{ in inches})$$
$$E = 3/20 \log_{10^{-1}} 0.71x \ (x \text{ in centimeters})$$

The approximate formulas for 11-in. (27.5-cm.) gap are

$$E = 3/5 \log_{10^{-1}} 2.09x \ (x \text{ in inches})$$
$$E = 3/5 \log_{10^{-1}} 0.82x \ (x \text{ in centimeters})$$

THICKNESS OF AIR HOLES TO BE RADIOGRAPHED

It remained to find the thickness of the smallest air-inclusion which could be radiographed in steel at 15-in. gap. For this purpose two plates of steel were taken. The faces were machined flat and in one of them a slot was cut, thus giving a *wedge* of air. The slot and the faces of the steel plates were then ground smooth. When completed, each plate

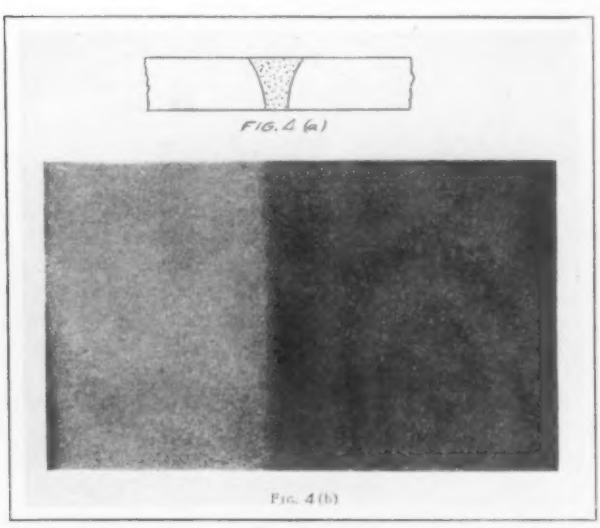
was ⅝ in. (15.5 mm.) thick. The air wedge was 10 in. (250 mm.) long, 1 in. (25 mm.) wide and 9/64 in. (3.52 mm.) thick at its thick end. When the two plates were bolted together, the air wedge simulated a blow-hole in a casting. The wedge was then radiographed at 15-in. (37.5-cm.) gap. When the X-ray plates were dry the place was noted at which the outline of the wedge was barely visible. In order to avoid error, only a small portion of the wedge was viewed at one time, the rest being blocked off with cardboard. It was found that an air inclusion 0.021 in. (0.52 mm.) thick could be detected in 1¼ in. (31.3 mm.) of steel. In ⅝ in. (15.6 mm.), an air inclusion of 0.007 in. (0.18 mm.) could be detected.

THE TECHNIQUE OF RADIOGRAPHY

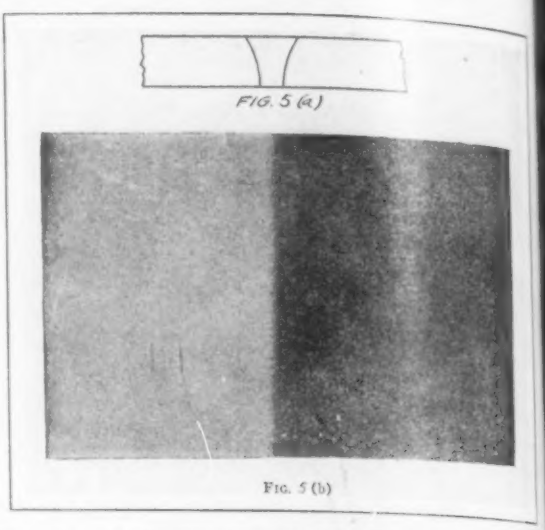
Besides the work above outlined, a great deal of work has been done in the actual taking of pictures, so that the technique of radiography through metals might be worked out.

A record of a single example will suffice. Four samples of autogenous welds in steel were obtained. The welding had been done with an oxy-acetylene flame. The samples were ½ in. (12.5 mm.) thick and about 4 in. (10 cm.) square. The faces were fairly rough. Sample No. 1 had only been welded on the surfaces. (See Fig. 2*b*.) Sample No. 2 had been insufficiently heated so that there was incomplete fusion of the metal at the center. (See Fig. 3*b*.) In welding sample No. 3 an excess of oxygen had been used in the flame, causing the presence of oxide on the surface. (See Fig. 4*b*.) Sample No. 4 was considered to be a good weld. (See Fig. 5*b*.) One-half of each face was machined off, so that half the length of the weld was between flat, parallel faces; the other half was left under the original rough surfaces. As a result, one-half of each sample was ½ in. (12.5 mm.) thick and the other half was about ⅜ in. (9.4 mm.) thick. Radiographs were taken at 15-in. (37.5-cm.) gap under the conditions described above. Reference to the formula for exposure at 15-in. (37.5-cm.) gap shows that the exposures through the ½-in. (12.5-mm.) and ⅜-in. (9.4-mm.) portions were in the ratio of 1 to 1.7. The resulting radiographs are shown in Figs. 2*a*, 3*a*, 4*a*, and 5*a*.

Fig. 2*a* shows clearly the unwelded center of sample 1 in both portions of the picture. Fig. 3*a* shows, in both portions of sample 2, the holes caused by the metal not having been thoroughly fused at the center. That portion of Fig. 4*a* which was taken through the machined end of the weld of sample 3 would seem to indicate a porous structure. Such a structure was evident during the machining. The portion of the picture taken through the unmachined end of the weld did not show such a structure with certainty. This was to have been expected, as the inequalities in thickness due to the uneven surface were at least as great as those due to porous or frothy structure. Fig. 5*a* shows that as far as gross structure is concerned, sample 4 was a good weld.



Figs. 4*a* and 4*b*.—Diagram of Section of the Weld in Sample No. 3 and a Radiograph of the Autogenous Weld in Sample No. 3. The weld is porous



Figs. 5*a* and 5*b*.—Diagram of Section of the Weld in Sample No. 4 and a Radiograph of the Autogenous Weld in Sample No. 4. A good weld

FACTS REVEALED BY RADIOGRAPHS

It is of course self-evident that a radiograph gives only the gross structure of the metal, and no information as to the "grain," crystal interlocking at the edge of the weld, etc. A radiograph does, however, give valuable information as to the presence of blowholes, slag inclusions, porous spots and defects of like nature, which could not be found otherwise except by cutting into the metal. Unfortunately, no fluoroscopic screen now known is sensitive enough for this work; all work in metals must be done radiographically. An inspection of the formulas derived above makes one feel that, for the present at least, radiography of steel is a commercial possibility only up to thickness of ½ in. (12.5 mm.). For greater thickness, the time required is excessive. The great saving in time which is gained by the use of a 15-in. (37.5-cm.) instead of a 13-in. (32.5-cm.) spark gap makes it seem probable that a further increase in the voltage across the tube would allow us to radiograph still greater thicknesses of steel.

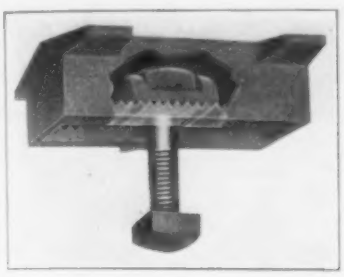
Internal Combustion Engine Slide Rule

A device for giving the approximate horsepower developed by internal combustion engines has been brought out by D. O. Barrett, 802 South McDonald Street, Lima, Ohio. The device, which is called the Gaspowrule, somewhat resembles the familiar engineer's slide rule in design. It can be used for four-cycle gas and gasoline engines and also for two-cycle semi-Deisel oil engines. Given the bore and stroke of the cylinder, the horsepower is obtained for the rotary speed. The rule is made of aluminum and the graduations are for a cylinder bore ranging from 4 to 16 in. in diameter and brake horsepower from 5 to 92. The strokes of the engine range from 3 to 40 in. and the speeds from 100 to 1600 r.p.m.

The Old Dominion Iron & Nail Works Company, Richmond, Va., is considering the installation of an electric steel furnace at its plant on Belle Isle for refining steel.

Hanger Insert for Concrete Buildings

The Diamond Expansion Bolt Company, 90 West Street, New York City, has placed two forms of concrete inserts on the market. As the name indicates these inserts are designed to be set in concrete ceilings, walls or floors when the forms are in place to provide a means for attaching pipe hangers and other supports to the finished concrete work. The two types of inserts are the same in general construction, the one illustrated being a one-piece malleable iron casting while the other is of the skeleton type construction, and the space in which the bolt head is placed is covered by a removable piece of pressed steel.



An Insert That Has Been Developed for Use in Connection with the Construction of Concrete Ceilings, Walls or Floors to Provide an Anchorage for Bolts

The special feature of these inserts is the use of teeth on the inner side of the aperture to hold the bolt in place when tightened or subjected to a load. The bolt is inserted as shown in the accompanying illustration with a bridging washer underneath the head or nut. It is pointed out that the bolt can be easily inserted or removed and the bridging member is locked within the aperture, thus preventing its removal by accident. The slot is the same width where the bolt and the bridging member are inserted, an arrangement which tends to give equal security throughout the entire length of the slot. Longitudinal and lateral adjustments, the latter being not as great as the former, are possible, thus enabling the position of the bolt to be shifted slightly after the insert is in place.

The inserts are furnished with two sizes of bridging members, one to accommodate the head of a ⅝ or 9/16-in. machine bolt, while the other will take either ½ or 7/16-in. bolts.

New Wire Cloth Plant at Cleveland

The Cleveland Wire Cloth & Mfg. Company recently established a plant at 3573-3581 East Seventy-eighth Street, Cleveland, Ohio, on a site of nearly an acre. It occupies a two-story brick building, 45 x 100 ft., provided with complete modern equipment for the manufacture of wire cloth. Another building, 40 x 100 ft., will be erected shortly for a galvanizing plant. A rolling mill will also be installed in this building for rolling wire cloth after it is woven. The company's products include heavy iron, steel, and galvanized wire cloth up to 1 in. mesh, made from 5/16-in. rods, in widths up to 84 in., and fine cloth down to 150 mesh. Wire cloth is furnished in steel, brass, copper and other commercial metals for about every purpose for which it is required. In the manufacture of screens the wires are double crimped, the warp and woof wires being crimped equally, thereby securely locking the wires at their intersection and insuring a uniform size of mesh. The company has a capital stock of $150,000 and its officers are A. L. Crone, president; E. T. Butler, vice-president, and M. A. Monaghan, secretary and treasurer.

Russia's output of copper for 1914 was 71,008,213 lb., or 2,879,159 lb. less than that of 1913, a decrease of 4 per cent, from data given out by the copper syndicate of Russia. Its estimated production for 1915 is 78,177,350 lb.

RAW COAL IN BLAST FURNACES

Its Introduction Through the Tuyeres to Be Covered by a German Patent

Stahl und Eisen has presented a discussion on the use of raw coal in the blast furnace by F. Lange, who has had 57 years of blast furnace experience. At the Phenix plant at Kupferdreh from 4 to 8 per cent by volume of lean and anthracite coal from a neighboring mine was mixed with the iron ore charge. This addition of raw coal was always found to have a good influence in the production of foundry iron, hematite, and ferrosilicon, and particularly on the silicon contents of metal. A similar addition is also to be recommended in the production of ferromanganese, especially when brown ore is used that contains the manganese as the higher oxide. Also the coke can be partly replaced by lump anthracite with a saving in cost depending on the prices of the materials. When, as in 1915, the lump anthracite was the same price delivered at Kupferdreh as the coke, there was still a considerable profit in using it because it contained 88 to 89 per cent carbon and only 4 to 5 per cent ash with about 2 per cent moisture.

A third use of raw coal is its introduction through the tuyeres directly into the furnace, but in a dry and very finely powdered condition, so that not more than 16 per cent remains behind on a 180-mesh screen. This use of raw coal is believed by Lange to have a good future, and he has applied to the German office for a patent. The patent situation is then gone into with some detail. In order to introduce successfully a part of the fuel at the tuyeres it is absolutely necessary that a sudden and intensive combustion take place, which can only be brought about by the greatest possible fineness of the coal. The temperature in the melting zone will be considerably increased, and the following advantages are to be expected.

1. The cost for fuel will be smaller, because the coke is partly replaced by the much cheaper coal. At Kupferdreh if one-sixth of the coke were replaced by the dry-powdered coal the saving would be 1.25 marks per ton of pig iron.

2. The production of ferrosilicon, ferromanganese, ferrochrome, etc., will be made easier and with ferromanganese there will be less loss of manganese in the slag.

3. In the reduction of high sulphur ores such as pyrites residues a more complete removal of the sulphur will be brought about through the higher lime that may be carried in the slags.

4. The top temperature will be lower, because less fuel will be added with the charge.

The influence of the fine coal may be compared with that of an increased blast temperature, because its effect is developed directly at the tuyeres. Its use is particularly recommended for small blast furnaces, which are preferable when fine ores are to be used. On account of the heat developed by the coal the blast temperatures could be lowered so that the old pipe stoves would be preferable, on account of the regularity of temperature thereby obtained. Of course, sufficient heating surface would have to be provided so as to give the temperature desired, and insure sufficient durability to the cast-iron pipes.

The writer takes up the form of top and design of furnace to use, and concludes by pointing out that the powdered coal provides a suitable means of heating the stoves when starting up or when the gas supply is insufficient for any reason. G. B. W.

Duplexing at the Algoma Plant

The Algoma Steel Corporation has successfully started duplexing at its plant at Sault Ste. Marie, Ontario. The demand for open-hearth steel was so great that it was necessary to increase output quickly. The company is now considering the immediate installation of a 300-ton open-hearth furnace and 20-ton converters to work much more economically the larger production of open-hearth steel.

The Consular Service in Business Getting

Dr. Pratt, Chief of the Commerce Bureau, Tells of Steps in Making It an Effective Machine for Export Trade Extension

WASHINGTON, D. C., Aug. 31, 1915.—That the Bureau of Foreign and Domestic Commerce, of the Department of Commerce, is performing highly important service in extending the foreign markets of manufacturers of the United States is well indicated in an interview given THE IRON AGE by Dr. Edward Ewing Pratt, chief of the bureau. Through the agencies of this bureau, it is pointed out, manufacturers who have formerly exhibited timidity in going after foreign trade are now pushing this business in a way that is producing results. By various legislative enactments the Government has consolidated in the Bureau of Foreign and Domestic Commerce all the agencies charged with the duty of building up the export trade of the United States and the results have proved the wisdom of such unification.

Referring at the outset to the common estimate of the formidable nature of export undertakings, Dr. Pratt said: "A direct commercial trip around the world requires a year or more and the expenditure of from $10,000 up. That would touch only the high spots and would not include such little side trips as those to the continents of Australia and South America. Many American manufacturers have not gone into foreign trade because it is such a big undertaking and is such an unknown field, the preliminary effort alone representing the cost of a small factory and much perseverance. Thoughtful men have recognized this fact and the economic importance to the country of building up an export trade in manufactured products to take the place of the disappearing exports of foodstuffs.

"Slowly but steadily the United States Government, therefore, has been building up a central organization in Washington to handle this question, together with a field force that constitutes a network of commercial scouts, investigators and counselors, covering the entire world. This field organization has three main divisions: 1. Three hundred American consuls, stationed in the leading cities of the world. 2. Traveling commercial agents. 3. Ten commercial attachés. The Bureau of Foreign and Domestic Commerce at Washington is the clearing house for the field work. It may be termed the dynamo from which lead wires carrying the energies that bring foreign business for American producers."

THE CONSUL AS A TRADE PROMOTER

Asked to speak in detail of the steps in the conversion of the consular organization into a more effective machine for trade extension, Dr. Pratt said:

"The consular service has been practically made over in recent years. Trade promotion was not its function ten years ago. There appears to be no record of an American consul ever having sent in a trade inquiry prior to 1905. To-day a rumor of a large order for machinery, of a railroad to be built, or of a proposed waterworks system, will automatically set the resident American consul very much in motion in order to get the details, plans, specifications, and blue-prints. It may be mentioned, parenthetically, that his success in this respect is often partly due to his personal social position established at his own private expense. The information is promptly sent to Washington, and there it is immediately passed out to the business houses of the United States, through the various agencies which have been built up by the Bureau of Foreign and Domestic Commerce.

"The important date of the working of the new consular service is April 5, 1906, when Congress pasesd a bill placing it on a salary basis, with a system of inspection and the establishment of grades. This was followed by a presidential order of June 27, 1906, which required civil service examination for appointment to consulates. Even then political preferment could have been continued, but from that date all eligibles have been given examination and appointment without consideration of party affiliations. This was enjoined upon the examining board by executive order.

NEW CONSULS AT LIVE CENTERS

"The most important step taken since that time was the Congressional bill passed in February, 1915, which fixed the salaries to meet the grades, thus making the consular service more mobile, and provided for the opening of new offices where they were much needed. This act enabled the Department of State to close the American consulates at such unimportant places as Owen Sound, Canada; Turks Island, West Indies; Iquique, Chile; Freetown, Sierra Leone; and Newchwang, China.

"The money saved by closing these consulates is being used in opening American consulates at the following important and promising commercial centers: Regina, in Saskatchewan, Canada's youngest province, where immigrants are rapidly developing the latent wealth; Prince Rupert, the new Pacific coast port of the Dominion, at the terminus of a new transcontinental railroad; Fort William—Port Arthur, Ontario, at the head of Canadian navigation on the Great Lakes, whose enormous traffic caused the Canadian Government to inaugurate $50,000,000 port work several years ago; Antofagasta, Chile, the outlet of a large mining region; Sao Paulo, the second most important city of Brazil; Mombasa, British East Africa, whence flows an immense traffic over the railroad to and from Victoria Nyanza and a rich African hinterland; Dakar, French Senegal, which has the finest harbor on the west African coast; and Changsha, capital of the rich Chinese interior province of Hunan.

"American business men are invited to supply these new consulates with their catalogs and write to them freely regarding commercial prospects. But they should be sure to use correct postage, as the consul's private purse is not a long one. Address simply 'The American Consul' at the places named.

"Many other progressive steps in building up the consular service have been taken since 1906. The number of consular assistants has been increased from 13 to 40; American clerks have to a large extent displaced foreigners, and this policy will be continued as money and men become available. Young Americans have also been engaged

to build up the student interpreter corps in Japan, China and Turkey. As a matter of fact, the recent consul-general at Hankow, China, who is now United States commercial attaché at Peking, went out originally as a student interpreter.

"Modern American office furniture, usually of steel construction, has been furnished to the 300 consulates. This has facilitated the business transacted and has so excited the admiration of foreign merchants that they have sent many orders to the United States for office equipment. The American consular service is rapidly becoming a business organization and is efficiently engaged in the active promotion of our commercial interests.

WORK OF COMMERCIAL AGENTS

"Coincident with the inauguration of this commercial consular service a decade ago was the establishment of a service of traveling commercial agents by the Department of Commerce. Both appropriations and results were meager at first, but the new agents set out for China and South Africa, for India and South America, and got busy. Their work has been growing in volume and value each year. One commercial agent was out only about a year, at a total cost of less than $10,000, and this is what he did: 1. Investigated the railroads of Australia; his published reports were so thorough that they have enabled American railroad supply firms to obtain large orders for equipment. 2. Sent from Peking the specifications for a million dollars worth of arsenal equipment for the Chinese Government, the order for which was finally obtained by a New England firm. 3. Made exhaustive reports on the electric plants of Chinese cities, the tin-mining industry of Malaysia, and the sugar industry of the Dutch East Indies. All these reports have permanent value and are available in monograph form.

SOME OF THE SPECIAL INVESTIGATIONS

"At the present time the commercial travelers of the Bureau of Foreign and Domestic Commerce are vigorously engaged in extending our foreign trade. Each man is an expert in some one line of business. A textile expert has finished his cotton-goods investigations in China and is proceeding to India. Two lumber specialists are touring the Far East and South America, carefully examining the prospects for increased exports of our timber products. A legal expert is studying the commercial laws of South America, on which the bureau will issue a treatise. A specialist on finance has just returned from Latin-America with material for publication on that important subject. He will also make a tour of the United States, conferring with bankers and others interested in foreign banking problems. Several new commercial agents have been recently selected, after examination, one of whom will go to the Far East to investigate the markets for American clothing, another to South America to find larger openings for American fruit, still another to South Africa to study the market for American agricultural and farm machinery, and another is about to go to South America on a similar errand. A hardware investigator has just brought back from South America several cases of hardware samples of all kinds, and these are being exhibited at the branch offices of the Bureau of Foreign and Domestic Commerce. His report and others which are being procured from the commercial attaché service will furnish a splendid epitome of what we can do to place more American hardware trade abroad.

"Another special agent, who has been in South America studying the field for machinery and tools, is visiting trade centers of the United States, conferring personally with our business men and giving them the information which he collected. He will soon return to Latin-America to learn more. The furniture trade in South America has also just been studied. A commercial agent has finished a tour of all the Central American states gathering general material for a Handbook on Central America, and will shortly go to the West Indies for the same purpose. Some of his current dispatches appear in daily "Commerce Reports." The Bureau of Foreign and Domestic Commerce takes up various foreign investigations from time to time and is now engaged in selecting two special agents who will go to South America to investigate the commercial prospects for furniture and wearing apparel.

COMMERCIAL ATTACHÉ SERVICE

"The initial $100,000 appropriation in 1914 for the new commercial attaché service enabled the bureau to establish ten men and their secretaries at the big capitals of the world. They are the commercial diplomats, who act with the ambassador or minister and perform a multitude of special tasks for the conservation and extension of our commerce with the world. Their posts are at Berlin, Petrograd, Paris, London, Peking, Melbourne, Lima, Santiago, Buenos Aires and Rio de Janeiro. Sufficient time has elapsed to test the value of this new service, and it may safely be said that it has already proved to be a profitable Government undertaking.

"The big daily volume of commercial reports of the consuls is forwarded promptly by the Department of State on the day of their receipt in Washington to the Department of Commerce. There in the Bureau of Foreign and Domestic Commerce they are joined with the incoming foreign field reports from the commercial attachés and commercial agents. In one central editorial division they are all co-ordinated, harmonized, and issued in the daily *Commerce Reports*, in confidential bulletins, in special books and pamphlets, ready for assimilation by those who would participate in gaining an export trade which will benefit both themselves and their country. The best part of it is that they are not delayed. Important reports from abroad reach the business public within 48 hours after their arrival in Washington." W. L. C.

The United States the Largest Exporter

The United States leads the world as an exporter for the first time in its history. Total exports for the fiscal year, ended June 30, 1915, aggregated $2,768,600,000, as against $2,170,100,000 for the United Kingdom. This is an increase of 17 per cent for the United States and 30 per cent for the United Kingdom compared with last year. Our exports 20 years ago, in 1895, were $807,500,000, against $1,391,000,000 for the United Kingdom. Exports of manufacturers from this country in 1821 were only $8,000,000, but in 1915 they were $1,166,000,000.

At the seventh annual convention of the Independent Petroleum Marketers' Association, held in Milwaukee, Wis., Aug. 24 to 27, the economical value of the steel barrel and metal container was the subject of several addresses. More than 50 manufacturers of metal packages, wooden packages, motor trucks, tanks, pumps and other material and supplies used in the petroleum industry held exhibits at the convention hall. The wooden package manufacturers were particularly active because of the inroads made by the producers of steel and sheet metal containers in the oil industry.

The Co-operative Spirit and Industrial Peace*

How True Modern Industrial Management Obliterates Four Important Causes of Strikes — A Contribution to the Sociology of Management

BY F. B. AND L. M. GILBRETH

If one were to ask any man experienced in the science of management what the one fundamental most necessary for its success was, he would undoubtedly answer, "The spirit of hearty co-operation." Yet it is the existence of this very spirit of co-operation that the majority of those who are opposed to, or who do not understand the science of management, doubt. "What proofs have you," say they, "that this spirit of co-operation really exists under the science of management, and that it is necessary?" It might be well to answer the second part of this question first.

The longer and more intensively one studies the science of management the more he realizes that a desire to work with others is absolutely essential if this science is to be successfully introduced, and especially if its results are to be maintained. The new type of management is based upon measurement, and no accurate measurement is possible unless the measurer and the measured co-operate fully and freely. If the data resulting from the measurement are not accurate the whole system falls to pieces at the very start. There may, of course, be improvements in methods and details, that is, in all the handling of the apparatus and equipment, though even these improvements are not to be trusted if the human element is not in sympathy with the work being done. Under scientific management the results of the methods are incorporated in the functionalizing of the work, and the assigning of the individual to it. These are both impossible without co-operation, for it will be impossible to discover an individual's preference and capabilities unless he is willing to have these known, and no tests of them will be of much use unless he is willing and anxious to be tested. Standardization, formulating the amount of work to be done in a given time, providing for rest and for pay, all of these depend absolutely upon the co-operation of the man doing the work with the man studying it. The system of promotion, of course, depends upon co-operation, and no successful teaching is possible without it.

CO-OPERATION NEEDED TO INTRODUCE SCIENTIFIC MANAGEMENT

Exactly what would happen in a plant where scientific management was to be introduced, and where the spirit of co-operation was not growing properly? Fostering the spirit of co-operation is the first work of the installer. In case co-operation was not growing and the installer should attempt to put in simply the mechanical details, he would probably meet with opposition very early in the installation period. This resistance would be quite justified from the standpoint of the workers, in that they were being asked to do something that they did not understand, and the logical outcome of which they had no method of knowing.

However, in actual practice a campaign of demonstration and education and object lessons is usually begun early and reaches every member of the organization. All feel that what is really to be done is to apply measurement, accurate measurement, but this is to be applied to all with no discrimination as to social standing, age, pay, position in the organization, or any other possible personal characteristic. It is well-known in every field of activity that while one may object to tests that are peculiar or apply only to a group or part of a group, when it is fully recognized that such tests are to be applied to all, the majority will at once eagerly agree to them and will take delight in driving the opposers into them. When it is realized that the testing period is made a period of special education, training and high pay, and that the results of the tests invariably add to the prosperity of the tested as well as his associates, it will be seen that, with the proper forethought, what may seem at the outset a serious problem becomes easy of solution.

FAILURE THROUGH MANAGEMENT NOT CO-OPERATING

Every element of the science of management rests so absolutely upon the spirit of co-operation that the moment this were to disappear, even in a well-regulated industrial plant, the entire system would fall to pieces. This has been demonstrated in several cases where the installation was not complete, but had, unfortunately, to be turned over to those who did not understand the science, before it was in a condition to maintain itself. Immediately, although the forms were fairly well kept up, the change in the spirit was felt, and the real benefits disappeared. This occurred, of course, simply from one cause, that the men who undertook the managing were not educated to understand the system and did not themselves co-operate.

No one can understand as can those who have for years devoted their lives to the study of the science of management, this absolute necessity for co-operation. Clever and satisfactory as the various devices are when used with the co-operative spirit, they are quite useless if the spirit is non-existent. An expert, wishing to judge of the state of installation in a plant would examine most carefully not the number of devices installed, not even the financial standing of the organization, but rather the attitude of every member in the organization towards the organization itself, and towards the new system of management. This spirit of co-operation is absolutely necessary.

MANIFESTATIONS OF THE CO-OPERATIVE SPIRIT

The next question that arises is, "Exactly how does this spirit manifest itself?" First, perhaps, in the growth and development of certain departments that are a part of the integral elements of its installation. Such, for example, is the suggestion system. The number of and the nature of the suggestions handed in and the number of those participating show the degree of confidence in the management that is growing up among the workers.

These same feelings are exemplified in the information bureau to which such information as might be needed by more than one member of the organization finds its way, there to be quickly available for the education and benefit of all. At first there may be a tendency to hold back this informa-

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tion, either with the belief that it is a personal secret that had best be individually conserved, or with a feeling that the holder can get the information much quicker himself, or can transfer it to others, if necessary, with greater speed than could the specially designated information bureau.

The interest in fatigue eliminating devices and the desire to establish a fatigue museum is another indication of the growth of the spirit of co-operation. The worker soon comes to feel that a collection of such devices is an undoubted proof that the management is actuated by the spirit of co-operation. In actual practice this soon results in the workers themselves devising not only fatigue eliminating devices but also devices for increasing output, many of which must be recast by the expert, in order to cut down fatigue, which was not an element greatly considered by the designer.

Perhaps the most striking recent illustration of the growth of this spirit of co-operation is in the home reading box movement.* This originated in our desire at one of our plants to do something to foster the spirit of co-operation in which all could have a part, and which would in no wise savor of charity.

CHANGE IN THE ATTITUDE OF THE INDIVIDUALS

The growth of these various devices of the science of management, if they may be so-called, was cited as the first proof that the spirit of co-operation did exist and did increase. The second lies in the actual change of attitude of the members of the organization themselves. It is a thing that must be personally observed to be understood. It is no strange experience to the installer of the science of management to be looked at with suspicion and distrust when he enters the industrial plant for the first time, if his identity and purpose are known. He may observe also the distrust that the members of the organization show toward one another, and particularly toward those who are in so-called higher positions, but he cannot fail to know that he is the chief object of distrust, and often of dislike and aversion.

It is, fortunately, also no unusual experience to the installer to see this attitude gradually change, and there is no moment that can tell him with the same assurance that he has done his work, as the one when he feels and sees from the look in the faces of the workers that they have come to regard him as a friend and measured functional management as a personal possession. It has been in many cases a joyful surprise to find, in a comparatively short space of time, that those at first most distrustful had become strong advocates of this type of management, even of the parts of it which they do not completely understand.

It is never a wise attitude to shut off any who are in an industrial plant that is having the science installed from intercourse with those who are violently opposed to it. On the other hand, it often proves of a decided advantage to encourage them to mingle as much as possible with those opposed to it, in order that their powers of argument may become stronger, and that they may have an incentive to get more information about the system in order the better to defend it. Even in plants where the educational feature is not emphasized during every moment of the day the spirit seems to be in the air, and, while some workers after years may still continue to say, "It is a fine thing, and I would not work under anything else, but I don't yet know very much about it," many others, especially among the younger men, will read and soon own the literature of the subject, and will gain a technical acquaintance with the entire setting that is truly surprising. Not only does the attitude toward the installer change so that he becomes the adviser and friend in many cases, but the attitude toward the managers, toward the other members of the organization changes.

*Described in THE IRON AGE of April 16, 1914.

WHY SCIENTIFIC MANAGEMENT MEANS INDUSTRIAL PEACE

Now what is the effect of these changes upon the question of industrial peace, that most serious of all industrial questions in this day and time? We might enumerate among the causes for industrial war the four that are the most important, and see the effect of this growth of the spirit of co-operation upon these four. These are:

1. Ignorance.
2. Instability of conditions.
3. Caste feeling.
4. Lack of a social element.

It is a peculiar characteristic of these four causes of industrial warfare that each one, upon examination, seems the vital and most important cause.

There is no one who will not agree that a great cause of industrial unrest is ignorance, though there will be strong disagreement as to where the ignorance lies. The average worker and his representative feel sure that the ignorance is with the employer, and, strange as it may seem, the average installer of the science of management agrees with the worker, saying that he invariably must concentrate most of his time and attention on teaching the management. The average manager would undoubtedly feel, even if he did not say, that the ignorance lies with the worker. The answer to this probably is that ignorance is of many kinds. The average worker undoubtedly does suffer from a lack of general knowledge and experience, and also from a lack of general knowledge and experience as to his own capabilities and possibilities. The average manager undoubtedly also suffers from a lack of certainty as to his own capabilities, and, to a great extent, from a lack of knowledge as to the capabilities of those who are working with and for him.

All suffer equally from a lack of appreciation of economics and psychology, and from a very vital lack of the knowledge of the benefits of co-operation. In the majority of plants there is equal ignorance on both sides as to what the science of management is, but the ignorance of the management is the more hopeless in that the worker is often ready and willing to acknowledge that he knows nothing about the subject, while the manager is invariably sure that he knows a great deal about it, and it is almost invariably certain that the things he thinks he knows are quite wrong. It is not only that the knowledge that comes with the introduction of scientific management helps all, but it is also that it is common to all and furnishes the common meeting ground. It is this that is so strong an incentive toward industrial peace.

The charge of instability might with equal right be brought by each side in the industrial war against the other. The managers claim that the men never know for any length of time what they really want, that their desires change constantly and that they are never satisfied. The workers claim with equal justice that they can repose little confidence in the stability of the management, that rates of wages are changed, that conditions are changed with no adequate explanation. The standardization that results with the introduction of scientific management alters all this. No changes are made that are not considered with care and

explained at length. This stability makes for industrial peace, and it is not a stability that means a lack of progress. It is a stability with provision for natural growth in every direction. It is not so much a stability of working forces and conditions, though these are important and are provided for, as it is a stability of ideals and a plan of development. There are no shocks and unpleasant surprises. Production becomes possible and fulfillment becomes sure.

The third cause for industrial war is often a great surprise to those who have not seriously considered it. "Caste in America," they will exclaim, "and in an industrial plant!" Yet it will take only a short consideration by anyone acquainted, even superficially, with industrial life to know that even here in democratic America the feeling of caste is extremely strong. It has often seemed to the writers that it is stronger in an industrial group than in any other type of group. It has disappeared more or less in many schools, especially in the public schools, in many clubs, in churches, in the party, and in the state; but in an average industrial plant it still remains strong, not only caste as existing between manager and managed and caste between trades, but caste between sub-divisions of a trade and between two men as intimately associated as a worker and his tender.

This discussion of the problems of management and their solution has been to little purpose, if it has not demonstrated that everything in the practice of scientific management tends to selection by efficiency and not by reason of caste. Some have said that it simply tends to transform caste, and that the efficient becomes of a higher class than the inefficient; but even this is not, strictly speaking, true, for, after all, the bonus gainer is extremely dependent upon his fellow worker, who may not succeed in getting a bonus, and there is nothing in the condition of the man who does not succeed to his fullest hopes to-day to prevent his becoming a successful man to-morrow.

The fourth cause of industrial warfare is a lack of a true social element. It may at first sight seem that the warfare is really the result of the existence of such an element, but it needs only a moment's thought to realize that, even though there are two parties to the strife, if each had something that held it together, the war could soon be settled finally, if disastrously, for one or both of the parties. As things exist, the bond which holds the members of either side together is only an apparent need that soon disintegrates and leaves havoc behind it.

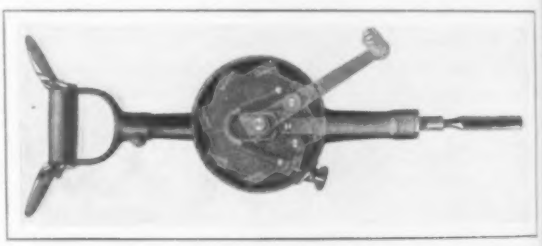
Now the spirit of co-operation does engender a real social feeling, that has been lacking to a greater extent in the industrial group than in any other. In the first place the system of management requires more personal relationship between those in the organization than has ever been required before. This might partly be called involuntary, and that is required for the working out of the system, but it is to a great extent also voluntary in that the common interest leads to meeting and discussion. But the great unifying force, the great creator of the social element is the fact that there comes to be a common ideal that is shared by every member of the organization. This ideal is this very feeling of the necessity of co-operation, the feeling that real success can never come until the organization acts as a unit.

This feeling exists not only in the members of the individual organization operating under scientific management, but between the numerous organizations so acting, and it is a feeling that lines them all up together, not as opposing those who have not favored the science of management, but simply as opposing anything that does not give every one a chance to do his best work. This spirit is growing throughout the country, is growing steadily and very apparently every year. It is not a feeling of "Keep out. We have a good thing." It is a feeling of "Come in and share this good thing." The spirit of co-operation is big enough to embrace not only those who are co-operating, but those who might and could; and it is this spirit that must inevitably bring about that much desired, lasting industrial peace that is the great goal of all those interested in social development.

An Improved Brick and Concrete Drill

An improved form of drill for brick and concrete work has been placed on the market by the Diamond Expansion Bolt Company, 90 West Street, New York City. The earlier type was illustrated in THE IRON AGE, Nov. 21, 1912. The principal changes are the provision of an adjustment screw for regulating the power of the blow exerted upon the drill and an extension spring operated over the yoke which straddles the main shaft at the rear of the plunger.

The spring is adjustable by a wing nut that varies the amount of tension in the spring. This adjustment, it is emphasized, enables light blows to be struck for drilling small holes in delicate surfaces, while by increasing the tension through the wing nut the drill can be made to deliver heavy blows for the larger sizes of holes in hard stone. The plunger slides between guide rollers and is rigidly attached to the yoke that straddles the main



A Recently Developed Drill for Brick and Concrete Work Having an Adjustment for Regulating the Force of the Blow

cam wheel shaft. This construction and the position of the tension spring and the adjusting wing nut are clearly brought out in the accompanying illustration.

To increase the efficiency of this drill where a number of holes are to be drilled in ceilings, a stand has been developed which is made in telescopic sections. The sections are readily adjusted to any heights of ceilings from 7 to 20 ft. and the drill is forced into the hole by a spring. Where work has to be done on a floor, a floor stand mounted on wheels has been developed which enables the operator to withdraw the drill from a hole easily and slide the drill and seat to the next one.

The Buffalo Wire Works Company, 316 Terrace, Buffalo, N. Y., announces that the increasing Eastern demand for its wire products has necessitated the opening of a branch office and warehouse in Philadelphia. The location of this branch will be at 11 South Seventh Street, the building hitherto occupied by the Rogers Wire Works (formerly the De Witt Wire Cloth Company), in the heart of the business section, adjoining the Franklin Institute. This places the company in an excellent position to care for rush orders in that territory. A complete stock of all grades of Buffalo wire cloth will be carried to meet the immediate requirements of customers.

Experience with a Storage Battery Truck

The use of mechanically-driven trucks in both large and medium-sized plants is increasing, due to the saving effected.

For a period of about eighteen months the Bullock Electric Company, Norwood, Ohio, a subsidiary company of the Allis-Chalmers Mfg. Company, Milwaukee, has had in use a 2-ton electric industrial truck and claims as to saving in time and labor effected are interesting.

Formerly the company found it necessary to use two railroad industrial trucks and six hand trucks to serve its factory departments. These trucks in all required ten men, while the one electric truck superseding them requires only two men. The following table is offered to show the relative costs of the different outfits for one year:

The Former Transporters

Two industrial railroad trucks at $90 each	$180.00
Six hand trucks at $15 each	90.00
Cost industrial track in factory	500.00
Total	$770.00
Interest for one year on $770 at 6 per cent	46.20
Total	$816.20

The Present Transporter

One electric industrial truck	$1,200.00
Interest on $1,200 at 6 per cent	72.00
Total	$1,272.00

From the above it will be noted that the difference in the initial cost of the two outfits is $455.80 in favor of the hand and industrial trucks. The following covers the comparative costs.

The Former Trucking Force

Ten men at $2 per day	$20

The Present Trucking Force

Two men at $2 per day	$4
Resulting in a saving per day of	$16

$88 each working week of 5½ days.

From this it is figured that the difference in the cost of the two outfits is wiped out in the labor saving in six weeks' time. Operating on a basis of fifty weeks a year, which was the case of the Bullock plant for the past twelve months, the saving in labor approximates $4,400, as against the use of hand trucks.

The question of depreciation is figured at 20 per cent for both outfits, so that the hand-trucking equipment has in its favor approximately $100, a reduction that is rather insignificant as compared with the results obtained.

The company's plant includes several buildings, two of which are three stories high and about 400 ft. long. One of these three-story buildings is located across a wide street opposite the storeroom and shipping department. The receiving and shipping departments as well as the storeroom are situated on the west side of the main building, necessitating maximum hauls from the storeroom of about 800 ft. No trouble has been experienced in carrying a full load of 4000 lb. over rough runways and down narrow aisles; loads are also carried to and from the building across the street. In serving the upper floors the truck is simply run on one of the many freight elevators in the different buildings and conveyed to the floor desired. Another use to which it is put is in delivering material from one shop department to another, where the overhead cranes cannot be used.

The maintenance expense, exclusive of current, is put at less than $50 for the entire eighteen months that the truck has been in use. The company has its own power plant, but had it been necessary to buy current from the public service power plant, the current cost would have averaged approximately 24c. a day. The truck, which was made by the Automatic Transportation Company, Buffalo, N. Y., is driven by a low-voltage series-wound motor, current to which is supplied from an Edison all-steel battery, carried in a steel box mounted on the chassis frame. A Morse silent chain drive is employed.

A small rear-end platform is provided for the driver, the controller also being mounted on this end support. Automatic brakes are provided that are released by means of a foot pedal and the action of releasing the brakes automatically applies the power. When the driver's foot is off the pedal the brakes are applied and the current shut off.

New High Speed Tool Steel Extras

The manufacturers of high-speed tool steels have adopted a new list of extras. It is stated that heretofore extras charged for odd sizes and small lots were not sufficient to cover the actual cost involved. The new extras are as follows:

Rounds, Squares and Octagons

	Extra Per Lb., Cents		Extra Per Lb., Cents
⅝ in. to 2 in.	base	5⅝ in. to 6 in.	5½
2⅛ in. to 2½ in.	2	6¼ in. to 6½ in.	6
2⅝ in. to 3 in.	2½	6⅝ in. to 7 in.	6½
3⅛ in. to 3½ in.	3	9/16 in. to ½ in.	2
3⅝ in. to 4 in.	3½	7/16 in. to ⅝ in.	3½
4⅛ in. to 4½ in.	4	5/16 in. to 11/32 in.	6
4⅝ in. to 5 in.	4½	¼ in. to 9/32 in.	8½
5⅛ in. to 5½ in.	5		

Flats

⅝ in. to 2 in. x ⅝ in. to 2 in.	base	⅝ in. x 7/8 in. to 1½ in.	3
1/8 in. x 3/16 in.	40	⅝ in. x 1⅝ in. to 5 in.	2½
⅛ in. x ¼ in.	30	7/16 in. x ½ in. to 1 in.	3
⅛ in. x 5/16 in.	20	7/16 in. x 1⅛ in. to 5½ in.	2½
⅛ in. x ⅜ in. to 2 in.	14	½ in. x ⅝ in. to 1 in.	2½
3/16 in. x ¼ in. to 3 in.	14	½ in. x 1¼ in. to 6 in.	2
¼ in. x 5/16 in. to ½ in.	8	9/16 in. x ⅝ in. to 1 in.	2½
¼ in. x ⅝ in. to 1 in.	5	9/16 in. x 1⅛ in. to 6 in.	2
¼ in. x 1⅛ in. to 4 in.	3	⅝ in. to 2 in. x 2⅛ in. to 4 in.	2
5/16 in. x ⅜ in. to ⅝ in.	5	⅝ in. to 2 in. x 4⅛ in. to 7 in.	4
5/16 in. x ¾ in. to 1 in.	3½	2⅛ in. to 3 in. x 2⅛ in. to 4 in.	2
5/16 in. x 1⅛ in. to 4½ in.	3	2⅛ in. to 3 in. x 4⅛ in. to 7 in.	4
⅜ in. x 7/16 in. to ¾ in.	3		

Intermediate sizes take next higher extra.

All dimensions inclusive.

Annealing, 2c. per lb. extra.

Bevels, same classification as flats plus 10c. per lb. for shape.

All special shapes not less than 10c. per lb. for shape.

Cutting to Specified Single and Multiple Lengths

	Extra Per Lb., Cents
24 in. and over	1c.
18 in. to 23 15/16 in.	2c.
12 in. to 17 15/16 in.	3c.
6 in. to 11 15/16 in.	4c.

Less than 6 in. special price.

High Speed Steel Classification of Forged Discs

	Extra Per Lb., Cents
Weighing above 25 lb.	6
Weighing 15 to 25 lb.	10
Weighing 10 to 15 lb.	12
Weighing 7½ to 10 lb.	14
Weighing 5 to 7½ lb.	16
Weighing 3 to 5 lb.	18
Weighing 2 to 3 lb.	22
Weighing 1 to 2 lb.	24

Annealing, 2c. per lb. extra.
Under 1 lb., flat price of $1 each.

High Speed Steel Classification of Forged Die Blocks

	Extra Per Lb., Cents.
Weighing above 25 lb.	4
Weighing 15 to 25 lb.	6
Weighing 10 to 15 lb.	10
Weighing 7½ to 10 lb.	14
Weighing 5 to 7½ lb.	16
Weighing 3 to 5 lb.	18
Weighing 2 to 3 lb.	22
Weighing 1 to 2 lb.	24

Annealing, 2c. per lb. extra.
Under 1 lb., flat price of $1 each.

The National Industrial Traffic League will hold its next meeting Sept. 9 and 10 at Toledo, Ohio. Business sessions will be held at the Zenobia Auditorium, and an informal dinner will be given at the Toledo Club on the evening of Sept. 9, at which Edgar E. Clark, member of the Interstate Commerce Commission, will deliver an address. The Secor Hotel will be the headquarters. H. G. Wilson of the Traffic Bureau of the Toledo Commerce Club is president of the association, and O. F. Bell, traffic manager of the Crane Company, Tacoma Building, Chicago, is secretary-treasurer.

Large Additions to Norton Plants

The latest additions to the plants of the Norton Company and Norton Grinding Company at Worcester, Mass., are three large buildings on Gleason Avenue, on which construction work was started Aug. 30. The largest of these buildings is to be used for the manufacture of grinding wheels, which form the chief product of the Norton Company. This unit will be of brick and steel, 60 x 176 ft., four stories, and will have a separate heating plant. Parallel with this building and connected with it by two covered passageways will be erected a two-story kiln shed, 81 x 176 ft. This shed, which will have a capacity for nine kilns, will be used for burning grinding wheels. Beside the kiln shed will be a coal shed, 33 x 176 ft., containing a spur track for the incoming coal cars. This coal shed will be connected with the other buildings by tunnels.

Another projected building, to be built between the plants now under construction and the present clay plant, will be known as the bond building. Details of this plant have not been worked out but when built it will be used for the manufacture and mixing of the bond or binding materials which hold the grains in the wheels. On the south side of the Boston & Maine tracks, opposite the old office building, a five-story concrete building, 90 x 250 ft., is being rapidly pushed to completion. This structure will be known as plant 4 and will be connected with plant 1 by a tunnel under the railroad tracks. It will be used for manufacturing and storage purposes. An addition is being made to plant 2 consisting of an extension to accommodate four kilns and to provide storage for coal and clay.

The Norton Grinding Company has completed a new heat-treating plant and lumber shed and is now constructing a new unit to be called mill 4. This building, 123 x 287 ft., is parallel with the three units now in use and is a one-story structure with balconies. It will be devoted to the assembling of Norton grinding machines and will have two 40-ft. cranes. The construction will be of the slow-burning type with brick walls.

The new Gleason Avenue buildings will be of the slow-burning mill construction type, with fireproof sash and sprinkler systems. This type of construction prevails in all the recent Norton additions with the exception of the concrete building now under construction.

Additions to the Canadian plants at Niagara Falls and Chippawa are also being made. Portions of some of the buildings at Niagara Falls have been razed and replaced with new structures. At Chippawa a new electric furnace is to be built and another abrasive plant will be erected.

Large Zinc Exports for One Year

Exports of zinc in the form of pigs, bars, plates and sheets for June, according to government statistics, were 8455 gross tons, compared with 6817 tons for May. This is the largest total since February, which showed 13,394 tons. For the twelve months ending with June, this year, the total exports were 114,593 tons, as compared with only 1783 tons to July 1, 1914. The following table gives the comparison of tonnage and values:

	Gross Tons	Value
June, 1914	240	$31,569
June, 1915	8,455	2,731,007
Twelve months ending June, 1913	6,616	924,234
Twelve months ending June, 1914	1,783	247,864
Twelve months ending June, 1915	114,593	20,067,306

While these figures show the effect of the war on exports, the actual consumption of American zinc due to the war is not represented, since large amounts are going out in the shape of munitions.

The Aug. 10 number of the *Bowser Boomer*, which is published semi-monthly by S. F. Bowser & Co., Fort Wayne, Ind., maker of oil storage systems, is given over to a brief description of the Panama-Pacific International Exposition.

Production of Coal in 1914

The production of coal in the United States in 1914 was exceeded by that in only two previous years—1912 and 1913. In 1914 the total production of anthracite and bituminous coal amounted to 513,525,477 net tons, valued at $681,490,643, according to C. E. Lesher of the United States Geological Survey. In 1913, the year of greatest production, the total was 569,960,219 net tons.

In 1914 the value of both bituminous and anthracite coal decreased slightly more than the tonnage, but the decrease in anthracite, the more valuable output, was slight.

The production of anthracite in Pennsylvania decreased from 81,718,680 gross tons (91,524,922 net tons), valued at $195,181,127, in 1913, to 81,090,631 gross tons (90,821,507 net tons), valued at $188,181,399 in 1914.

The total production of bituminous coal and lignite decreased from 478,435,297 net tons in 1913, valued at $565,234,925, to 422,703,970 tons in 1914, valued at $493,309,244.

The decrease in the production of anthracite was due in part to mild weather during the winter in the area where it is used almost exclusively for a domestic fuel and in part to decreased exports to Canada.

The decrease in the production of bituminous coal was generally distributed over the country, but there were seven States in which the production in 1914 was greater than in 1913. Two of these States, North Dakota and South Dakota, produce lignite only, and make relatively small output. New Mexico's increase was due to ability to supply markets ordinarily furnished by coal from Colorado, which in 1914 suffered from a serious strike. The other States that showed an increase were West Virginia, Kentucky, Michigan and Oregon. The greatest decrease was in Pennsylvania, whose output fell off almost 26,000,000 tons. The most notable decrease was in Ohio, where, because of strikes, the decrease was over 17,300,000 tons, or nearly half, as compared with 1913.

Lake Superior Mining Institute Papers

A partial list of papers to be presented at the twentieth annual meeting of the Lake Superior Mining Institute, beginning at Ironwood, Mich., Sept. 6, is as follows:

"Sheet Ground Mining in the Joplin District, Missouri," by Edwin Higgins, mining engineer, Bureau of Mines, Ironwood, Mich.

"Rock-Drifting in the Morris-Lloyd Mine, Marquette Range," by J. E. Hayden, mining engineer, Ishpeming, Mich.

"Sinking of the Woodbury Shaft at the Newport Mine, Gogebic Range," by J. M. Broan, mining engineer, Ironwood, Mich.

"Mining Methods on the Gogebic Range," by Oscar Olson, Frank Blackwell, O. M. Schaus, committee.

"A Survey of the Developments and Operations in the Cuyuna Iron Ore District of Minnesota," by Carl Zapffe, geologist, Brainerd, Minn.

"The Mining School of the Cleveland-Cliffs Iron Company," by C. S. Stevenson, director educational department, Ishpeming, Mich.

"Grouting at the Francis Mine Shaft of the Cleveland-Cliffs Iron Company," by John R. Reigart, assistant superintendent, Princeton, Mich.

"New Stock-Pile Trestle, Colby Iron Mining Company," by G. S. Barber, superintendent, Bessemer, Mich.

"Opening of the Wakefield Mine," by W. C. Hart, superintendent, Wakefield, Mich.

"The Use of Gunite in a Steel Shaft and in an Underground Pump-House on the Gogebic Range," by Steven Royce, general engineer, Hurley, Wis.

The Industrial Commission of Wisconsin is about to publish in pamphlet form the revised State building code, effective Sept. 20, covering every kind of building construction, with the exception of private residences, two-family apartments, farm buildings and temporary sheds or buildings used for construction purposes only. It prescribes rules for the installation of boilers, furnaces, smoke pipes, steam pipes, hot air pipes, electrical work, lights and roof coverings, and safety regulations for elevators and the installation of fire prevention service.

ENGINEERING CONGRESS

tallurgical and Mechanical Engineering Papers to Be Read at San Francisco

One of the fifty odd sessions of the International gineering Congress to be held at San Francisco in week of Sept. 20 is to be devoted to iron and steel tallurgy. The symposium to be provided has been anged by Dr. Henry M. Howe. Under the division metallurgy there will also be separate sessions on per, gold and silver, zinc, etc., including one on the ilization of fuels in metallurgy. Series of sessions also scheduled on different groups of materials of gineering, on different phases of mechanical engineer-, on different branches of mining engineering and electrical engineering, waterways, irrigation, mu-ipal engineering, railroad engineering, etc.

After a general opening session on Monday morn-, Sept. 20, at which, among other things, the John fitz medal will be presented to Dr. James Douglas, st president and honorary member of the American titute of Mining Engineers, a general session de-ed to the Panama Canal will be held in the after-on. To this meeting contributions will be made by g.-Gen. G. W. Goethals, late chairman and chief neer Isthmian Canal Commission; by Emory R. nson, professor of transportation and commerce, iversity of Pennsylvania, on "Commercial and Trade pects of the Panama Canal"; by Major F. C. Boggs, ps of Engineers, U. S. A., and general purchasing er of the Panama Canal, Washington, D. C., on rchase of Supplies for the Panama Canal," and by ers.

The papers scheduled for the iron and steel metal-ical session, to be held Tuesday afternoon, Sept. are as follows:

"Iron and Steel Castings," by John Howe Hall, metallurgi-engineer, Taylor-Wharton Iron & Steel Company, High dge, N. J.

"Metallography and the Hardening of Steel," by Albert ver, professor of metallurgy and metallography in vard University, Cambridge, Mass.

"Case Hardening of Steel," by Prof. F. Giolitti, Turin, y.

"The Duplex Process of Steel Manufacture," by F. F. s, Maryland Steel Company, Sparrows Point, Md.

"Methods of Preventing Piping in Steel Ingots," by Emil hmann, Baltimore, Md.

"Steel Alloys," by George L. Norris, American Vanadium pany, Pittsburgh, Pa.

"Electro-Metallurgy," by Dr. E. F. Roeber, editor *Metal-rgical and Chemical Engineering.*

Among papers on materials of engineering construc-n to be presented at Wednesday and Thursday sions are the following:

"The Outlook for Iron," by Prof. James Furman Kemp, mbia University.

"Alloy Steels in Bridgework," by Dr. J. A. L. Waddell, ulting engineer, Kansas City, Mo.

"The Economics of the World's Supply of Copper," by as T. Read, San Francisco.

"Consumption of Copper and Its Various Uses," by H. D. s, United Metals Selling Company, New York, N. Y.

"Alloys and Their Use in Engineering Construction," by Reuben Webster, Bridgeport, Conn.

"The Engineering Uses of Aluminum," by Prof. Joseph ards, Lehigh University, South Bethlehem, Pa.

"Testing of Materials," by R. G. Batson, National Physical ratory, Teddington, England.

"Testing Full Size Members," by Gaetano L. Lanza, adelphia.

Among papers on mechanical engineering are the owing:

"Recent Advances and Improvements in Founding," by late Thomas D. West, Cleveland.

"Forgings from Early Times until the Present," by C. Philp, manager machinery department Bethlehem Steel pany, South Bethlehem, Pa.

"Recent Progress and Present Status of the Art of Forg-with Special Reference to the Use of Quick-Acting Forg-Presses," by A. J. Capron, Park Iron Works, Sheffield, land.

"Machine Shop Equipment, Methods and Processes," by E. R. Norris, Director of Manufacturing Operations, Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa.

"Machine Shop Equipment, Methods and Processes," by H. F. L. Orcutt, Gear Grinding Company, Ltd., Birmingham, England.

"Automatics," by R. E. Flanders, Jones & Lamson Machine Company, Springfield, Vt.

"High Temperature Flames in Metal Working," by H. R. Swartley, Jr., Jersey City, N. J.

"Power Plant Design," by H. S. Putnam, consulting engineer, New York City.

"The Internal Combustion Engine of the Year 1915. The Gas Power System. A Survey of Its Status in the Year 1915," by Prof. Charles Edward Lucke, Columbia, University.

"The Development of the Construction of Turbines in the Netherlands," by D. Dresden, mechanical engineer, Gebroeders Stork & Co., Hengelo, The Netherlands.

"The 1915 Steam Turbine," by E. A. Forsberg, Stockholm, Sweden.

"The Diesel Engine in America," by Max Rotter, chemical engineer, Busch-Sulzer Bros. Diesel Engine Company, St. Louis.

"Safety Engineering," by Dr. Frederic Remsen Hutton, New York City.

"Motor Vehicles; Passenger Type," by Ethelbert Favary, New York City.

"Motor Vehicles; Utility Type," by A. J. Slade, New York City.

"Motor Tractors," by F. S. Davis, International Harvester Company, Chicago.

"The Boiler of 1915," by Arthur D. Pratt, assistant to Advisory Engineer, Babcock & Wilcox Company, New York City.

"Compressed Air in the Arts and Industries," by W. L. Saunders, president Ingersoll-Rand Company, New York City.

"Equipment, Processes and Methods for Boiler Shop," by E. C. Meier, Phoenixville, Pa.

A few of the papers in other divisions of the congress may be mentioned as follows:

"Electric Welding," by C. B. Auel, director of standards, processes and materials, Westinghouse Electric & Mfg. Company, Pittsburgh, Pa.

"The Application of Electricity to the Heating of Metals," by F. L. Bishop, dean, School of Engineering, University of Pittsburgh.

"The Electric Motor as an Economic Factor in Industrial Life," by David B. Rushmore, chief engineer, Power and Mining Department, General Electric Company, Schenectady.

"The Influence of the Electric Motor on Machine Tools," by A. L. De Leeuw, Singer Mfg. Company, Elizabethport, N. J.

"Pulverized Coal in Reverberatory Furnaces," by D. H. Browne, International Nickel Company, New York.

"Gas Producer Development," by Z. C. Kline, engineer, Rhode Island Glass Company, Central Falls, R. I.

"Developments and Progress in Scientific Management During Recent Years," by E. P. Lesley, Stanford University, Cal.

The United Smelting & Aluminum Company, New Haven, Conn., is enlarging its plant, adding a new three-story building, greatly increasing manufacturing space and storage room. It is also installing the most modern improvements for the production of pure aluminum ingots, alloys, shot or granulated aluminum, aluminum solder, etc., including ten new melting furnaces. The company will then have a capacity of over 20,000 lb. per day.

The Spengler-Loomis Mfg. Company, 58 East Washington Street, Chicago, has decided to engage in the manufacture of electrical heating appliances, which are expected to be ready for the market in about two months. The company has retained as its consulting engineer H. O. Swoboda, Empire Building, Pittsburgh.

Philadelphia Day at the conventions of foundry interests to be held at Atlantic City, N. J., Sept. 25 to Oct. 2, will be Sept. 30, when many of the foundries of Philadelphia and vicinity are expected to close, and special excursion trains will be run to Atlantic City.

The total number of foreign-built vessels admitted to American registry to Aug. 21, 1915, or in practically one year of the new law's operation (Aug. 18, 1914), was 159, of 559,763 gross tons.

ESTABLISHED 1855

THE IRON AGE

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The Rise in Steel Prices

The rise in steel prices since last December has been more moderate than that which occurred in 1912. The upward movement of 1912, it will be recalled, began about the close of November of the previous year, there having been very heavy buying of railroad equipment in October and November, with moderate buying in other directions. The rise of 1912 may be dated from Dec. 1, 1911, while that of this year may be dated from Jan. 1. Even if a price of 1.35c. on bars, plates and shapes be assumed, the average level of finished steel prices, at the end of eight months of advance, would be slightly lower than the average level on Aug. 1, 1912, when the movement of that time was eight months old. What has been impressive this year is the steadiness with which prices have advanced. There has been no recession as there was in February, 1912.

Steel prices in the past have moved according to principles more or less thoroughly understood in the trade, but conditions this time have been exceptional. It is quite unlikely that anyone would have been able to predict, a year ago, what was to occur as to steel prices, even if a full statement had been furnished as to the character and volume of demand to be expected, and as to the attendant circumstances. On the one hand there has been the altogether exceptional war demand, while on the other hand there has been a domestic demand which is clearly seen to be less than is to be expected in ordinary prosperous times. With respect to the fact that the war demand is export demand the rule would be that it should not occasion any violent fluctuations in prices, but with respect to its being a demand for war purposes it would naturally be expected to result in relatively high prices, and such has been the case. The extent to which war prices would be reflected in domestic prices it would certainly have been impossible to forecast. The most noticeable dislocation has been that plates in recent weeks have been selling at from $1 to $2 a ton below bars, in the domestic market, whereas until quite recently there was usually a spread of $2 a ton in the other direction.

Apart from conditions arising out of the nature and extent of the demand for steel the industry has been confronted with special conditions such as would encourage price advances. There has been continued uncertainty whether there would be a sufficient supply of labor for the industry with its related branches, and it is only in the past few weeks, since the actual test of capacity operations has been undergone, that these fears have been largely allayed. The ferromanganese situation has been very threatening, a supply of ferromanganese being a vital necessity, and it is really surprising that the steel market has taken so little cognizance of the danger of an acute shortage.

It seems fair, therefore, to regard the rise in finished steel prices to date as being a very conservative one in the circumstances. Whether advances in future will be at a corresponding pace is of course another matter entirely. The unfinished and finished steel markets now have the support of a very respectable pig-iron advance, something that was conspicuously lacking in the first six months of this year. Pig iron in the various markets has advanced an average of more than $1 per ton since July 1, before which date there has been no more than minor fluctuations. The expressed view of the furnacemen, expressed more in words than in deeds, in the case of some furnace interests which have sold for extended delivery, is that the pig-iron market is going much higher. Some buyers have expressed a similar view by making purchases. The pig-iron market, however, still has to undergo the test of the material increase in production which can occur by the advanced prices now quoted affording an opportunity to idle furnaces to blow in, furnaces that could have been operated only at a loss with the prices bid a couple of months ago. The merchant furnace output, as reported in THE IRON AGE lately has been only about 20,000 tons a day, whereas both 1909 and 1913 rates of about 28,500 tons a day were attained, although there were some idle furnaces at the time and productive capacity has been increased somewhat since.

With the steel market there is no such contingency as a material increase in production, substantially the entire available capacity for making steel has been in operation during the past two months. A slight increase in output, of course, is to be expected as plants reach a smoother rate of operation and weather conditions improve with

the season, but the possibilities of increased production are much less in steel than in pig iron. The steel market thus far has shown such independence of the pig-iron market that it would hardly be affected by a failure in pig iron to continue the remarkable advancing tendency it has displayed in the past two months, while further advances in pig iron might easily be reflected in a more rapid advance in steel products.

The Drop in Sterling Exchange

An important result of the European war has been the unprecedented decline in the rate of exchange between New York and London. From a time "in which the memory of man runneth not to the contrary" the British pound sterling has been the equivalent of $4.8665 in United States currency. This is the rate established by law for the settlement of invoices of the various custom houses in this country. Variations from this rate have been made occasionally in the transactions of commercial houses, depending upon the abundance or scarcity of international bills of exchange, but they have usually been so small as to be the subject of little comment outside of the banking houses conducting such business. When the war broke out a year ago this country was so heavily indebted to Europe that the rate of exchange rose much higher than that officially recognized by the United States Government. The inability of our bankers to meet the European obligations so suddenly pressed for payment caused extraordinary measures to be taken to secure a large supply of gold to tide over the emergency, and it will be remembered that Canada was made the depositary of a huge amount for this purpose. But this condition was only temporary. Since then the United States has been called upon to supply the belligerents with great quantities of foodstuffs, army equipment, horses, munitions of war, etc., the value of which has steadily kept largely in excess of merchandise being imported from Europe. For a long time each month has witnessed an enormous excess of exports over imports which has not been counterbalanced by the resale to this country of American securities held in Europe. The consequence of this reversal of our international relations is seen in the great decline in exchange rates. On Tuesday of this week the decline had gone so low that the pound sterling was quoted at $4.55, New York. This represented a fall of $0.3165 from the Government standard. It meant that the United States dollar on this basis was worth nearly $1.07 in English money.

The significance of this great change in what has heretofore been an almost inflexible standard of exchange lies in its application to manufacturers and merchants in this country who have made their contracts for the sale of material to Europe with terms of payment based on the British pound sterling. They are facing a discount of over 31 cents to the pound on such transactions up to this time, with the possibility that it may be still greater. It is probable that those having experience in international transactions have endeavored to guard against this contingency by basing their contracts on American money. If they have not done so, the decline in the value of the pound sterling represents quite a reduction in the profits of many whose contracts call for large amounts of money.

The nearest parallel to the present situation is to be found in the period prevailing from 1897 to about 1902 when this country so rapidly developed its export trade to Europe. At that time we were just emerging from the depression caused by the panic of 1893 and the silver agitation, we were enjoying the benefit of the cheap ore from the Mesaba mines, and our prices, especially of steel products, were so low that our manufacturers were able to make great inroads on European trade. The excess of our exports over imports in those years mounted to high altitudes, as compared with a long series of years immediately preceding. They ran annually from $286,263,144 up to $664,592,826, causing large importations of gold and seriously disturbing European financiers. So threatening was "the American invasion," as it was called, that the chancellories of Europe seriously considered the necessity of taking concerted action by their governments to combat the influx of American merchandise and the disturbance of their home markets. At that time, however, no such decline in the rate of exchange with London was witnessed as is now being seen. It is one of the most extraordinary developments of international finance that has ever been experienced. It would seem to point to the dominance of this country in the finances of the world.

The War's Cripples in Industry

Industry after the European war will need to provide occupations for the crippled survivors. So vast are the numbers who will be unable to perform fully their former tasks that there will be group consideration of this phase of the industrial problem which heretofore the individual has had to solve for himself. No doubt Europe is already doing much to make the unfortunate of maximum usefulness to himself and to society, but such is the underlying humanitarian attitude of the age that the scale of this movement will force economic readjustments that are sure to be felt. It is to be remembered that such a war means not alone that large numbers are being subjected to mutilations, but that modern surgery is saving lives if it does not save limbs.

The movement has already been heard of in this country. At least one machine manufacturer has been asked to produce a lot of what may be regarded as simple, or perhaps single-purpose metal-working machines, and a summer industrial management school has seriously taken up the problems of allocating cripples in industries. One can imagine departments of a factory with machines for operations not requiring, say, the use of both arms or not demanding high manual dexterity. Chairs adapted to the work may be made to open certain branches to those minus a foot or a leg. In competition with more highly specialized machines and with operators having all their limbs and every organ of sense, it is reasonable to expect that wage rates for the unfortunate must compensate for the differences. There will be new overhead charges for the special accommodations pro-

vided; the new machines may be per unit less expensive than the type which has become the feature of the modern shop, but production is likely to suffer in comparison. The difference in capitalization of the machines for the two classes of workmen and the output per unit of capital investment might easily be such that a difference of a few cents per hour in wage rates would put the crippled workmen on a level thoroughly secure, from an economic as well as humanitarian viewpoint.

Rail Mills as Bar Mills

THE IRON AGE . . . quotes the leading steel companies as predicting continuance of the present activity of operation throughout 1915, and at least some distance into 1916. The rather obvious fact is also noted that "the railroads, in their later buying of the year, will have to compete for mill capacity with the buyers of munitions."—*New York Evening Post*, Aug. 25.

When fully stated the condition is by no means an obvious one. The railroads, if they should come into the market for rails to be delivered in the next four months, would run upon a situation such as has never been duplicated in their dealings with the steel mills. Three or four important rail mills are now engaged in rolling large rounds, such as have been bought for shell stock by the belligerent nations and the numerous manufacturers who are exerting themselves to make deliveries of munitions. It is a case of a demand for several hundred thousand tons of round bars of large sections, and of these rail mills being the only available high power capacity that could cope with it. Heretofore rail mills have simply stood idle when rail orders failed, with the rare exception of interchangeable rail and billet rolling capacity, but even then billet orders were scarce when rail orders fell off. To-day's orders for large rounds are imperative, and they have been taken at prices yielding unusual profits. Much more of the same sort of business is under negotiation, and some of these rail mills may be working on rounds in the first quarter of 1916. Such an unprecedented situation might develop another feature quite as unprecedented in the experience of the present generation of steel makers—a premium for the early delivery of rails.

CORRESPONDENCE

Government Service vs. Corporation Service

To the Editor: I have read with some interest the letter of H. D. Murphy on the subject of postoffice efficiency, in which letter he charges the Postoffice Department with not being able to discover who may have opened and re-sealed a certain package while it was in the hands of the postoffice employees, and from this incident draws the conclusion that government ownership of public service functions is hopeless.

As a result of very considerable experience with industrial organizations employing thousands of people handling small pieces of work, many of these employees being in groups each of which performs a single operation upon identical pieces, I am curious to know if Mr. Murphy has discovered a way by which if any irregular thing is done to one of these pieces the particular employee who did it can be identified.

The only way that occurs to me for doing it in the case of mail is to have every employee who handles any piece of mail stamp it with a rubber stamp bearing his initials and the time at which he handled it. Would Mr. Murphy believe that such a plan should be followed, and would he be willing to submit to the delay that would be caused by it and to pay his share of the expense of doing it?

Mr. Murphy has had, I assume, considerable experience with express companies and with transportation companies. Has he found them generally any more courteous or willing to go to any more pains than the Postoffice Department, by his own showing, did in this case, and has he found that they are generally any better able to identify the employee who may have injured an express or freight package?

FRED J. MILLER.

New York, Aug. 30, 1915.

Manganese Determination In Steel and Pig Iron

To the Editor: The following modified method for determining manganese in steel or pig iron is superior to the persulphate and original bismuthate methods:

Dissolve from 0.2 to 1 gram of steel or pig iron in 25 cc. of 1.20 sp. gr. nitric acid. When the nitrous fumes cease, add 2 gr. of ammonium persulphate to oxidize the carbonaceous matter and boil 2 min., then dilute to approximately 200 cc. of water and cool. When cold add 2 gr. of sodium bismuthate, and agitate for 1 min. and let it stand for 5 min. Then filter the excess of bismuth and titrate with sodium arsenite; titrate the excess of arsenite with n/60 of permanganate. The arsenite solution being standardized by 0.2 gr. sample of standard manganese steel, 1 cc. is equal to 0.01 manganese.

This method eliminates high results which seem to hold true on the original bismuthate method and is much superior to the persulphate method as to time and results.

F. H. PETERSON,
Chief Chemist Nova Scotia Steel & Coal Company.
New Glasgow, N. S.

Large Increase in American Shipbuilding Over Other Nations

The increase in American shipping tonnage in the fiscal year ended June 30, 1915, according to Lloyd's Register of Shipping, has been 524,445 gross tons, or about four times our average annual increase for the ten years up to June, 1914. It is also larger than the annual increase of tonnage under the British flag, including the dominions and colonies, for the ten years up to June, 1914, which was 403,000 tons. The American increase is practically made up of 523,361 gross tons, owned under foreign flags by American capital and transferred under the ship registry act of Aug. 18, 1914, since the war began. Of this total 333,639 gross tons was transferred from the British and 147,742 tons from the German flag.

The increase in the world's tonnage since June 30, 1914, virtually the war period, is only 172,217 gross tons, while the average annual increase for the ten years up to June, 1914, was 1,308,000 tons.

British tonnage for the year increased 229,019 gross tons against an average annual increase of 403,000 tons for the ten years before 1914. German tonnage for the year shows a loss of 753,269 gross tons, while the 10-year average up to 1914 was an annual increase of 189,000 gross tons. Japanese shipping increased 117,682 gross ton, the average annual increase before the war being 95,000 tons.

Philadelphia to-day is the greatest shipbuilding center in the United States, so extensive have been recent developments. It is also a close rival for world honors. Ships under construction and in tonnage in that city are surpassed by only three centers in Great Britain, namely, Belfast, Glasgow and Newcastle-on-the-Tyne.

On June 30, 1915, there were thirty-three ships, of 120,675 gross tonnage, under construction there. At the same time the Glasgow yards were working on eighty-two ships of 353,923 gross tons; Newcastle-on-the-Tyne, sixty-two ships of 270,854 gross tons and Belfast, twenty-four ships of 267,700 gross tons. If the ten warships being built at Philadelphia were included, that city would lead Belfast and Newcastle.

Operations at Eddystone, Pa.

In reply to a request for a statement as to the operations at Eddystone, Pa., in which the Baldwin Locomotive Works is interested, S. M. Vauclain, vice-president of that company, briefly recounted the various activities as follows:

The Baldwin Locomotive Works is engaged in filling large export orders for locomotives and their parts, including wheels, tires, axles and various forgings. The company now has 11,500 men on its pay-roll.

The Remington Arms Company of Delaware has leased a number of buildings which the Baldwin Locomotive Works has erected, suitable for the manufacture by the Remington Company of a large number of military rifles which are to be exported. This plant when running full will probably employ 15,000 men.

The Eddystone Munitions Company has leased from the Baldwin Locomotive Works buildings which the latter has erected on its property at Eddystone. The manufacture of munitions by the company will probably employ 10,000 men.

The Baldwin Works contemplates building on the river front at Eddystone a pier or bulkhead so that shipments of all classes of products made by the companies mentioned may be made direct, without transshipment at New York or any other port.

Snyder Electric Furnace for Canada

The Canadian Brake Shoe Company, Ltd., Sherbrooke, Que., Canada, has placed an order with the Snyder Electric Furnace Company, 53 West Jackson Boulevard, Chicago, Ill., for the installation of a Snyder electric furnace for the melting of steel. This furnace will melt and refine cold material and will deliver 24 tons per day of twenty-four hours. The steel will be used for the manufacture of 4-in. rounds to be forged into shells for the British Government, for which electric steel is especially adapted.

The Canadian Brake Shoe Company has been operating a steel foundry for many years, using electric furnaces exclusively for melting. It now has six furnaces of the three-electrode type in operation. The Snyder furnace is being installed under guarantees as to operating cost that will effect a large saving.

Manganese Ore From Cuba

Some information bearing on recent shipments of manganese ore from Cuba to the United States for conversion at seaboard into ferromanganese is contained in the bulletin by D. F. Hewitt of the U. S. Geological Survey, "The Production of Manganese and Manganiferous Ores in 1914." The Cauto Mining Company at San Nicolas north of Santiago is mining about 1500 tons of manganese ore monthly which contains 43 to 47 per cent manganese, 9 per cent silica, 2 per cent iron and 0.05 per cent phosphorus. Small selected lots contain 85 to 87 per cent manganese dioxide. The ore is mined from an open cut, hand-picked, and raised by an incline to a log washer, where it is prepared for shipment. Prospecting near Santiago continues, but no other mines are now shipping.

M. A. Hanna & Co., Cleveland, Ohio, are making extensive improvements to their Fannie blast furnace plant at West Middlesex, Pa. These include the installation of a pig casting machine, a 45-ton crane, and two 60-ton stationary short pouring ladles, and the erection of a ladle house. The same firm is installing a new pig casting machine at its Dover furnace, Canal Dover, Ohio. Both contracts are being executed by Arthur G. McKee & Co., engineers, Cleveland.

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LaBelle Iron Works to Build By-Product Ovens

The LaBelle Iron Works, Steubenville, Ohio, has placed a contract with the H. Koppers Company, First National Bank Building, Pittsburgh, for the erection of 94 Koppers by-product coke ovens. These ovens will be built across the Ohio River from the present plant of the LaBelle Iron Works, where it owns a site of 160 acres lying between the Pittsburgh, Wheeling & Kentucky Railroad and the river. The coke will be hauled to the blast furnaces at Steubenville, via the Pennsylvania Railroad, but some time in the future a bridge may be built across the river. The ovens will have a daily capacity of about 1000 tons of blast-furnace coke. The plant is expected to be ready for operation in about nine months.

The Columbian Enameling & Stamping Company, Terre Haute, Ind., manufacturer of enameled ware, is operating its plant 24 hr. a day, filling orders for export to South America, Cuba and Australia, where it did practically no business before the war. It has recently had inquiries from Greece. When the Japanese Commercial Commission made its tour of the United States it requested the Columbian Company to ship samples of its products to that country and a large line is on its way there. The articles are packed in substantial boxes, with hinged lids, so that they can be opened for inspection at every port where it is possible to exhibit them.

The No. 2 Crane furnace of the Empire Steel & Iron Company at Catasauqua, Pa., will go in blast about Oct. 1. Its capacity is 250 tons a day.

The Iron and Metal Markets

LARGER WAR BUSINESS

Higher Labor Costs Are a Factor

Sales of Steel-Making Pig Iron at Advancing Prices—Speculative Southern Iron a Factor

The main features of the steel situation are the large amount of new war business offered, particularly in bars and wire, and the fact that the possible open-hearth steel output of the remaining months of this year is nearly all under contract. Thus the very moderate pace at which new domestic business is coming in brings no misgivings.

Some parts of the industry, particularly those merchant furnaces at which wages were reduced as pig iron prices went below cost last year, are now facing higher labor cost. A few wage advances have been announced. There is yet no actual scarcity of labor, but the bidding of new munitions plants for skilled labor drawn from other operations is being felt in the iron trade. Moreover, not only are iron and steel works missing the thousands of men who have come from Europe at every previous turn of the tide here, but they have lost some thousands to Europe this year.

There are signs that with each month the war is taking a larger part of the country's steel production. One of these is the increasing reticence of steel makers as to war contracts. It is understood, however, that 70,000 tons of round bars was booked at Chicago in the past week, also that 40,000 tons of rounds went to Pittsburgh and 50,000 tons to a Mahoning Valley plant.

There seems no end to the barb wire demand from Europe. Inquiries cover about 100,000 tons, including one for 25,000 tons of painted barb wire which has come up at Cleveland. Foreign buyers are even trying to get hold of warehouse stocks. The high prices due to this export demand now promise to cut down home consumption of fence wire.

The possibility that war orders for large bars may fill up certain rail mills for the early months of 1916 has started no rail buying as yet and steel makers are not soliciting rail business. At Chicago the St. Paul road has closed for its structural and other steel for 1916, repeating this year's order. The Pennsylvania has placed 3500 to 4000 tons of bridge work, and the Santa Fe is in the market for its 1916 requirements.

Prices on bars, plates and shapes are stronger and Eastern structural mills have been able to get $1 a ton more than the Pittsburgh basis of 1.35c. In the West 1.30c. for plates is still to be found, though the plate mills of the leading Pittsburgh interest are six to eight weeks behind orders.

The quick reversal of form in spelter has brought advances in galvanized sheets and galvanized wire products. The latter are up $2 a ton. For No. 28 galvanized sheets the range is 3.60c. to 3.75c., but buyers are in no mood to move, fearing another drop in spelter.

The billet market still shows the anomaly of a spread between Pittsburgh and Eastern prices much in excess of the freight to the East. Buyers are offering premiums for early shipment.

Pig iron is higher in the East and the advancing tendency continues, though less strongly marked, in Central Western and Southern irons. Buying for 1916 is small, but meanwhile the producers' ideas of next year's prices are higher. At Chicago, where the advance in foundry iron has been relatively small, malleable companies are inquiring for enough iron to take up the local furnace capacity for the remainder of the year.

Some sales of Southern iron held by speculators have been made at $11.50, Birmingham, for No. 2 for early shipment, and the amount of such iron is a factor to be reckoned with.

In Ohio furnace companies differ in their ideas of the future on foundry iron. Sales have been made as low as $14 for No. 2 at Lake furnace and for first half of 1916 sales at both $14.50 and $15 at Valley furnace are reported.

A 12,000-ton sale of basic iron for first half of next year was made in the East, and the American Steel Foundries bought 13,000 tons in the Central West, mostly at $14.50 at furnace. Another sale of 10,000 tons was at $14.50. At Buffalo a steel company is in the market for 60,000 tons for this year. The very heavy business of the steel companies is tending to lift prices for all merchant pig iron.

Bessemer iron has sold at $15.50 at Valley furnace and an export sale of 3000 tons was made at $16 at furnace.

Increasing Bessemer operations and the present large output of higher carbon rounds have made possible the use of spiegeleisen in part in place of ferromanganese and a round-lot purchase of the former by a steel interest is reported.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type. Declines in Italics

At date, one week, one month and one year previous

	Sept. 1, 1915.	Aug. 25, 1915.	Aug. 4, 1915.	Sept. 2, 1914.
Pig Iron, Per Gross Ton:				
No. 2 X, Philadelphia	$15.50	$15.50	$14.50	$14.75
No. 2, Valley furnace	14.50	14.50	12.75	13.00
No. 2 Southern, Cin'ti	13.90	13.90	13.15	13.25
No. 2, Birmingham, Ala	11.00	11.00	10.25	10.00
No. 2, furnace, Chicago*	13.50	13.50	13.50	13.50
Basic, del'd, eastern Pa	**16.50**	15.50	14.00	14.00
Basic, Valley furnace	14.50	14.50	13.00	13.00
Bessemer, Pittsburgh	16.45	16.45	15.20	14.90
Malleable Bess., Ch'go*	13.50	13.50	13.50	13.50
Gray forge, Pittsburgh	14.45	14.45	13.45	13.65
L. S. charcoal, Chicago	16.25	16.25	15.75	15.75
Billets, etc. Per Gross Ton:				
Bess. billets, Pittsburgh	23.50	23.50	22.50	21.00
O.-h. billets, Pittsburgh	24.00	24.00	22.50	21.00
O.-h. sheet bars, P'gh	24.50	24.50	23.50	22.00
Forging billets, base, P'gh	**30.00**	29.00	28.00	26.00
O.-h billets, Phila	32.00	32.00	30.00	23.40
Wire rods, Pittsburgh	28.00	28.00	26.00	26.50
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia	1.459	1.459	1.35	1.15
Iron bars, Pittsburgh	**1.35**	1.30	1.25	1.20
Iron bars, Chicago	1.25	1.25	1.20	1.07½
Steel bars, Pittsburgh	1.30	1.30	1.30	1.20
Steel bars, New York	1.519	1.519	1.469	1.36
Tank plates, Pittsburgh	1.30	1.30	1.25	1.20
Tank plates, New York	**1.519**	1.469	1.419	1.36
Beams, etc., Pittsburgh	**1.35**	1.30	1.30	1.20
Beams, etc., New York	1.519	1.519	1.469	1.36
Skelp, grooved steel, P'gh	1.30	1.30	1.25	1.20
Skelp, sheared steel, P'gh	1.35	1.35	1.30	1.25
Steel hoops, Pittsburgh	1.35	1.35	1.30	1.30

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	Sept. 1, 1915.	Aug. 25, 1915.	Aug. 4, 1915.	Sept. 2, 1914.
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh.	1.90	1.90	1.80	1.95
Sheets, black, No. 28, P'gh.	**3.60**	3.40	4.00	2.95
Galv. sheets, No. 28, P'gh.	1.65	1.65	1.60	1.60
Wire nails, Pittsburgh..	1.60	1.60	1.55	1.60
Cut nails, Pittsburgh....	1.50	1.50	1.40	1.40
Fence wire, base, P'gh..	**2.50**	2.40	2.50	2.00
Barb wire, galv., P'gh..				
Old Material, Per Gross Ton:				
Iron rails, Chicago.....	$12.25	$12.25	$12.25	$12.00
Iron rails, Philadelphia.	**18.00**	17.00	15.50	14.00
Carwheels, Chicago	11.75	11.75	11.50	11.25
Carwheels, Philadelphia..	13.50	13.50	12.75	11.50
Heavy steel scrap, P'gh..	14.00	14.00	13.25	11.25
Heavy steel scrap, Phila.	**14.25**	14.00	13.00	10.50
Heavy steel scrap, Ch'go.	11.75	11.75	11.25	9.50
No. 1 cast, Pittsburgh...	13.00	13.00	12.00	11.50
No. 1 cast, Philadelphia.	**14.00**	13.50	12.50	12.00
No. 1 cast, Ch'go (net ton)	10.00	10.00	9.50	9.50
Coke, Connellsville,				
Per Net Ton at Oven:				
Furnace coke, prompt...	$1.50	$1.50	$1.50	$1.70
Furnace coke, future....	1.75	1.75	1.75	1.75
Foundry coke, prompt..	2.00	2.00	2.00	2.20
Foundry coke, future....	2.25	2.25	2.25	2.35
Metals,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York..	*18.00*	19.00	21.00	13.00
Electrolytic copper, N. Y.	**17.75**	16.00	18.25	12.37½
Spelter, St. Louis.....	**16.00**	12.25	17.25	5.90
Spelter, New York.....	**16.25**	12.50	17.50	6.05
Lead, St. Louis.....	**4.75**	4.35	4.90	3.72½
Lead, New York.....	**4.90**	4.50	5.00	3.87½
Tin, New York.....	*33.50*	33.75	35.50	38.00
Antimony, Asiatic, N. Y.	*28.00*	28.50	34.50	12.50
Tin plate, 100-lb. box, P'gh.	**$3.15**	$3.10	$3.10	$3.60

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 22.9c.; Denver, 68.6c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c., on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes. The foregoing rates to the Pacific coast are by rail. The rate via New York and the Panama Canal has no stability, being dependent on vessel charges.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.30c. base net cash, 30 days. Following are stipulations prescribed by manufacturers:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated Feb. 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft. are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gage or weight to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gages under ¼ in. to and including 3-16 in...	.10
Gages under 3-16 in. to and including No. 8.....	.15
Gages under No. 8 to and including No. 9.....	.25
Gages under No. 9 to and including No. 10....	.30
Gages under No. 10 to and including No. 12....	.40
Sketches (including straight taper plates), 3 ft. and over	.10
Complete circles, 3 ft. in diameter and over....	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel.....	.20
Stid bottom steel	.30
Marine steel	.40
Low-carbon firebox steel	.50
Widths over 100 in. up to 110 in., inclusive.....	.05
Widths over 110 in. up to 115 in., inclusive.....	.10
Widths over 115 in. up to 120 in., inclusive.....	.15
Widths over 120 in. up to 125 in., inclusive.....	.25
Widths over 125 in. up to 130 in., inclusive.....	.50
Widths over 130 in.....	1.00
Cutting to lengths under 3 ft. to 2 ft., inclusive.	.25
Cutting to lengths under 2 ft. to 1 ft., inclusive.	.50
Cutting to lengths under 1 ft.....	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Wire Products.—Prices to jobbers, in effect from Aug. 23: Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $1.50; galvanized, $2.20. Galvanized barb wire and staples, $2.50; painted, $1.80. Wire nails, $1.65. Galvanized nails, 1 in. and longer, $1.75 advance over base price; shorter than 1 in., $2.25 advance over base price. Woven wire fencing, 71½ per cent off list for carloads, 70½ off for 1000-rod lots; 69½ off for less than 1000-rod lots.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12&12½	13	14	15	16
Annealed	$1.55	$1.60	$1.65	$1.70	$1.80	$1.90	$2.00	$2.10
Galvanized ...	2.45	2.50	2.55	2.60	2.70	2.80	3.10	3.20

Wire Rods.—Bessemer, open-hearth and chain rods, $28.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 1.35c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909....	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths under 3 ft., to 2 ft. inclusive.	.25
Cutting to lengths, under 2 ft., to 1 ft. inclusive.	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from Aug. 16, 1915, all full weight:

Butt Weld

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
⅛, ¼ and ⅜	72	46½	⅛ and ¼	64	37
½	76	59½	⅜	64	37
¾ to 3	79	63½	½	68	47
			¾ to 2½	71	52

Lap Weld

2	76	60½	1¼	55	36
2½ to 6	78	62½	1½	66	47
7 to 12	76	58½	2	67	49
13 and 14	62½	..	2½ to 4	69	52
15	60	..	4½ to 6	69	52
			7 to 12	67	50

Reamed and Drifted

1 to 3, butt	77	61½	1 to 1½, butt	69	50
2, lap	74	58½	2, butt	69	50
2½ to 6, lap	76	60½	1¼, lap	53	34
			1½, lap	64	45
			2, lap	65	47
			2½ to 4, lap	67	50

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	67	49½	⅜	61	43
½	72	58½	½	66	51
¾ to 1½	76	62½	¾ to 1½	70	53
2 to 3	77	63½	2 and 2½	71	54

Lap Weld, extra strong, plain ends

2	73	57½	1½	65	48
2½ to 4	75	59½	2	67	49
4½ to 6	74	58½	2½ to 4	69	52
7 to 8	68	50½	4½ to 6	68	51
9 to 12	63	45½	7 to 8	61	44
			9 to 12	56	39

Butt Weld, double extra strong, plain ends

½	62	48½	½	56	40
¾ to 1½	65	51½	¾ to 1½	59	43
2 to 2½	67	53½	2 and 2½	61	45

Lap Weld, double extra strong, plain ends

2	63	49½	2	57	40
2½ to 4	65	51½	2½ to 4	59	45
4½ to 6	64	50½	4½ to 6	58	44
7 to 8	58	40½	7 to 8	51	33

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on the black and three (3) points on galvanized.

Boiler Tubes.—Discounts on less than carloads, f.o.b. Pittsburgh, freight to destination added, in effect from July 16, 1915.

Lap Welded Steel		*Standard Charcoal Iron*	
1¾ and 2 in.	63	1¾ and 2 in.	50
2¼ in.	60	2¼ in.	47
2½ to 2¾ in.	66	2½ and 2¾ in.	54
3 and 3½ in.	71	3 and 3¼ in.	58
3½ and 4½ in.	72	3½ and 4½ in.	60
5 and 6 in.	65	5 and 6 in.	54
7 to 13 in.	62		

Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., 10 per cent net extra.
2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipment on sheets of U. S. Standard gage, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net, or 2 per cent cash discount in 10 days from date of invoice.

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	1.40 to 1.45
Nos. 9 to 10	1.45 to 1.50
Nos. 11 and 12	1.50 to 1.55
Nos. 13 and 14	1.60 to 1.65
Nos. 15 and 16	1.70 to 1.75

Box Annealed Sheets, Cold Rolled

	Cents per lb.
Nos. 10 and 11	1.55
No. 12	1.55
Nos. 13 and 14	1.60
Nos. 15 and 16	1.65
Nos. 17 to 21	1.70
Nos. 22 and 24	1.75
Nos. 25 and 26	1.80
No. 27	1.85
No. 28	1.90
No. 29	1.95
No. 30	2.05

Galvanized Sheets of Black Sheet Gage

	Cents per lb.
Nos. 10 and 11	2.60 to 2.75
No. 12	2.70 to 2.85
Nos. 13 and 14	2.70 to 2.85
Nos. 15 and 16	2.80 to 2.95
Nos. 17 to 21	2.95 to 3.10
Nos. 22 and 24	3.15 to 3.30
Nos. 25 and 26	3.30 to 3.45
No. 27	3.45 to 3.60
No. 28	3.60 to 3.75
No. 29	4.35 to 4.50
No. 30	4.60 to 4.75

Pittsburgh

PITTSBURGH, PA., Aug. 31, 1915.

The demand continues heavy. Most steel works are now pretty well sold up on all the products they can turn out to the end of the year. The shortage in the supply of open-hearth steel is getting serious, and it is hard to obtain prompt delivery at any price. Nearly all the steel mills are back four to six weeks in deliveries on billets and sheet bars, in spite of the fact that they are running to 100 per cent of capacity. Basic and Bessemer pig iron have been fairly active. Basic has advanced squarely to $14.50, and Bessemer has sold in small lots at $15.75, and for export at $16, Valley furnace. Prices on finished iron and steel are strong and slightly higher figures are quoted this week on galvanized sheets, owing to the renewed advance in spelter. The foreign demand for barb wire is enormously heavy, and the wire mills are all running to their utmost capacity with their product well sold up for the remainder of the year. Wire rods are very scarce and are quoted as high as $29 for domestic and $30 and higher for export business. Coke is dull and prices continue low. There is not much activity in scrap, but prices are fairly firm.

Pig Iron.—The new demand for basic iron has been quite active and heavy sales have been made at higher prices than were ruling a week ago. The American Steel Foundries has bought 13,000 tons of basic. Of this 3000 tons was taken by Banning, Cooper & Co. at $15 delivered, Sharon, Pa., and Alliance, Ohio, being 1500 tons for each plant; 5000 tons by E. W. Mudge & Co. at $14.50, Valley furnace, and 5000 tons by M. A. Hanna & Co. at the same price. Part of the iron to come from Mudge & Co. may be shipped to Granite City, Ill., where the American Steel Foundries has a large works, idle for some time, but which is expected to start up in the near future. We also note another sale of 10,000 tons of basic for delivery over the remainder of the year at $14.50, Valley furnace. Some sellers are asking $14.75 to $15 for basic, but so far as known no sales have been made higher than $14.50, Valley furnace. Reports that the local steel company which recently bought 25,000 tons of basic paid $14.25, Valley furnace, are incorrect, as the iron went at a lower price. The market on Bessemer is quite active, sales having been made the past week at $15.50 to $16, Valley furnace, the higher price having been paid for iron for export. We note a sale of 3000 tons of Bessemer, equal deliveries October, November and December, at $15.50; 500 tons at $15.75, and 3000 tons for export to Italy, sold by W. P. Snyder & Co., at $16, Valley furnace. There was not much doing in foundry iron the past week, but the market is strong. The Westinghouse Electric & Mfg. Company has closed for about 13,000 tons for Cleveland for second and third quarter of next year. Some furnaces refuse to quote for delivery so far ahead. Malleable Bessemer and forge iron are quiet. We quote: Standard Bessemer iron, $15.50 to $16; basic, $14.50; malleable Bessemer, $14.25 to $14.50; No. 2 foundry, $14.50 to $15; gray forge, $13.50, all at Valley furnace, the freight rate for delivery in the Pittsburgh or Cleveland district being 95c. per ton.

Billets and Sheet Bars.—The billet and rail sales bureau of the Carnegie Steel Company states that its actual orders for billets, sheet bars, rails and steel ties sent to the mills for rolling in August showed a slight increase over July, and would have shown a very much larger increase if the company could have supplied the demands made on it for steel. The situation in open-hearth sheet bars is getting tighter, they being very hard to obtain at any price and usually bringing premiums where the buyer wants fairly prompt deliveries. Prices on forging billets are higher, sales having been made at $30 to $31 for delivery over the next two or three months, and as high as $33 has been paid for small lots for prompt shipment. Reports of sales of forging billets of ordinary carbons in the Pittsburgh district at prices as high as $38 to $38.50 are not credited here. The Youngstown mills have very little steel to spare. Prices are very strong both there and in Pittsburgh, and likely to be higher. We quote: Bessemer billets, $22; open-hearth billets, $24; Bessemer sheet bars, $24, and open-hearth sheet bars, $24.50, Youngstown; Bessemer billets, $23 to $23.50; open-hearth billets, $24 to $24.50; Bessemer sheet bars, $24, and open-hearth sheet bars, $24.50, f.o.b. Pittsburgh mills. We quote forging billets at $30 to $31 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 per ton extra. Axle billets are held at $27 to $28.

Ferroalloys.—Small sales of 80 per cent English ferromanganese of carloads and up to 100 tons are being made at prices ruling from $100 up to $105 and $110, seaboard. New demand is quiet and local consumers seem to be getting fairly prompt deliveries. We quote 80 per cent English ferromanganese in carloads and larger lots at $100 to $110, seaboard. We quote 50 per cent ferrosilicon in lots up to 100 tons, at $73; over 100 tons to 600 tons, $72; and over 600 tons, $71, delivered in the Pittsburgh district. We quote 10 per cent Bessemer ferrosilicon at $18; 11 per cent, $19; 12 per cent, $20, all f.o.b. cars at furnace Ashland, Ky., Jackson or New Straitsville, Ohio, each of these points having a rate to Pittsburgh of $2 per gross ton. We quote 20 per cent spiegeleisen at $25 at furnace. We quote ferrotitanium at 8c. per pound in carloads, 10c. in 2000-lb. lots and over, and 12½c. in smaller lots. We quote ferrovanadium at $2 to $2.25 per pound of contained vanadium, prices depending somewhat on the size of the order.

Structural Material.—New inquiry in the past week has been quiet and no specially large jobs have been placed. The Penn Bridge Company, Beaver Falls, Pa., has taken two buildings for the Valley Mold & Iron Company, Sharpsville, Pa., about 600 tons. Prices are very firm. We quote beams and channels up to 15-in. at 1.30c. to 1.35c., f.o.b. Pittsburgh.

Plates.—New orders for plates are only fairly active. There is very little buying of steel cars, but a good deal of business is being placed for boat and Government work. The Carnegie Steel Company has in operation all its plate mills to utmost capacity, and is back in deliveries from six to eight weeks. Other plate mills are running practically full, and the smaller mills are now quoting about the same price as the larger makers. The only active inquiry out for cars is one for 500 stock cars for the Atchison, Topeka & Santa Fé. The plates and shapes for the 750 box cars ordered by

the Atlantic Coast Line from the Mount Vernon Car & Mfg. Company, Mount Vernon, Ill., will be supplied by the Illinois Steel Company, and not by the Carnegie Steel Company, as reported. It is stated that the Butte, Anaconda & Pacific has an inquiry for 100 cars and the Cuba Company for 500 sugar and flat box cars, but these inquiries have not reached the car builders. The Riter-Conley Mfg. Company will build tanks and kilns for the Aluminum Ore Company, East St. Louis, to take 2200 tons of plates. We quote ¼-in. and heavier plates at 1.30c. to 1.35c., f.o.b. Pittsburgh. The lower price now seems to be minimum of the market.

Steel Rails.—Small orders for standard sections ranging up to 500 tons are being placed for this year's delivery, but there are no large contracts. The new demand for light rails is fairly active, the Carnegie Steel Company having received new orders and specifications in the past week for about 2500 tons. Up to Sept. 1, the Carnegie Company had sold more than double the number of steel ties that it had sold up to the same period in last year. We quote standard sections rails of Bessemer stock at 1.25c., and of open-hearth, 1.34c., f.o.b. Pittsburgh. We quote light rails as follows, in carload lots: 8 and 10-lb. sections, 1.275c.; 12 and 14-lb., 1.225c.; 16 and 20-lb., 1.175c.; 25, 30, 35, 40 and 45-lb. sections, 1.125c. The prices of light rails are materially shaded on large lots.

Tin Plate.—The Standard Oil Company of New Jersey has placed an order with the American Sheet & Tin Plate Company for 225,000 to 250,000 boxes of coke plates to be made into oil cans. These run in two sizes, 14 x 18¾ in. for making the sides of the cans, and 10 x 20 in. for the tops and bottoms, the latter being cut in two and made into 10 x 10 in. size. It is stated that competition for this order was very keen. Specifications against contracts for tin plate are fairly active, but not as heavy as some time ago. There is still some foreign demand, but it has also quieted down. Local mills are making regular shipments to England, South America and other countries. Operations are active, the American Sheet & Tin Plate Company and other larger mills running from 90 to 100 per cent. Prices are firmer and on small domestic orders we quote 14 x 20 coke plates at $3.15 to $3.20 per base box, f.o.b., Pittsburgh, depending on the order.

Sheets.—On Monday, Aug. 30, the American Sheet & Tin Plate Company advanced its price on blue annealed sheets to the basis of 1.50c. for Nos. 9 and 10 gage and other makers have done the same. Prices on Bessemer black sheets are firm, nearly all the mills quoting 1.90c. Owing to the flurry in spelter, prices on galvanized sheets are firm and the mills are asking more money, but there is very little buying. Consumers hesitate to place orders for galvanized sheets, fearing that present prices will not hold. The sheet mills are operating all the way from 65 to 100 per cent of capacity, some of the larger mills running at the lower rate. The range in prices on galvanized sheets this week is 3.60c. to 3.75c., but the sheet mills are insisting that their selling agents submit all inquiries to the home office before the order is definitely taken. We quote No. 28 galvanized sheets at 3.60c. to 3.75c.; No. 28 Bessemer black sheets, 1.90c.; Nos. 9 and 10 blue annealed, 1.45c. to 1.50c.; No. 30 black plate, tin-mill sizes, H. R. & A., 1.95c.; No. 28, 1.90c.; Nos. 27, 26 and 25, 1.85c.; Nos. 22 to 24, 1.80c.; Nos. 17 to 21, 1.75c.; Nos. 15 and 16, 1.70c. The above prices are for carload lots, f.o.b. at maker's mill, jobbers charging the usual advances for small lots from store.

Wire Rods.—The heavy demand for plain and barb wire and for other wire products has caused a decided scarcity in the supply of wire rods. Two local makers say they have no rods to spare for remainder of this year. Specifications against contracts are very active. There is some foreign inquiry for rods, and on these mills are quoting as high as $30. We quote Bessemer, open-hearth and chain rods at $28 to $29, f.o.b., Pittsburgh, depending on the order and deliveries wanted.

Wire Products.—Prices on galvanized extras, which were reduced last week from 80c. to 60c., have been advanced to 70c., due to the flurry in spelter. The domestic demand for wire nails is quiet, but the mills are not worried about this as they can put the steel into other forms. The foreign demand for barb wire continues heavy, and the mills have no trouble in booking all the business on which they can make deliveries at full prices. It is believed that the consumption of fence wire this fall will be curtailed on account of the high prices, and that many farmers will put off for a year, or until next spring at least, the building of new fences. Prices to the large trade, effective from Aug. 30, are as follows: Wire nails, $1.65; galvanized nails 1 in. and longer taking an advance over this price of $1.75, and shorter than 1 in. $2.25. Plain annealed wire is $1.50; galvanized barb wire and fence staples, $2.50; painted barb wire, $1.80; polished fence staples, $1.80, all f.o.b., Pittsburgh, with freight added to point of delivery, terms sixty days net, less 2 per cent off for cash in ten days. Prices on woven wire fencing are 71½ per cent off in carload lots, 70½ per cent on 1000-rod lots, and 69½ per cent on small lots, f.o.b., Pittsburgh.

Cold-Rolled Strip Steel.—Owing to the very active demand and higher prices for raw materials, the base price of cold-rolled strip steel has been advanced to 3c., and orders are being taken by the mills at this price. To regular customers and for desirable orders, possibly a slightly lower figure might be named. All the makers of cold-rolled strip steel report they are running to utmost capacity, and have the greater part of their output sold over the remainder of this year. The foreign trade is active, considerable shipments abroad being made. We quote hard-rolled steel, 1½-in. and wider, under 0.20 carbon, sheared or natural mill edge, per 100 lb., $3 delivered. Extras, which are standard among all mills, are as follows:

Thickness, in.	Extras for thickness	Extras for soft or intermediate tempers	Extras for straightening and cutting to lengths not less than 24 in.
0.100 and heavier	Base	$0.25	$0.10
0.099 to 0.050	$0.05	0.25	0.15
0.049 to 0.035	0.20	0.25	0.15
0.034 to 0.031	0.35	0.40	0.25
0.030 to 0.025	0.45	0.40	0.40
0.024 to 0.020	0.55	0.40	0.50
0.019 to 0.017	0.85	0.50	1.10
0.016 to 0.015	1.25	0.50	1.10
0.014 to 0.013	1.95	0.50	1.25
0.012	2.30	0.50	coils only
0.011	2.65	0.50	coils only
0.010	3.00	0.50	coils only

Skelp.—The new demand is dull owing to the quietness in the pipe trade, but the skelp mills have a fair amount of work ahead and prices are firm. We quote grooved steel skelp at 1.30c. to 1.35c.; sheared steel skelp, 1.35c. to 1.40c.; grooved iron skelp, 1.70c. to 1.75c., and sheared iron skelp, 1.80c. to 1.85c., delivered to consumers' mills in the Pittsburgh district.

Railroad Spikes.—There is no new demand for railroad spikes, all roads being covered by contracts placed some time ago, but specifications are dull, due to the fact that the railroads are doing very little new track laying. Prices are reported firm. We quote standard sizes of railroad spikes at $1.50, and small railroad and boat spikes at $1.60 per 100 lb., f.o.b. Pittsburgh.

Rivets.—The new demand is active and there is a good deal of foreign inquiry. Several local makers of rivets state they have their output practically sold for the remainder of this year, and specifications are heavy. It is stated that prices are likely to be higher in the near future, as the market on steel is steadily advancing. We quote buttonhead structural rivets at $1.60 and conehead boiler rivets at $1.70 per 100 lb., f.o.b. Pittsburgh, small lots bringing about 10c. advance.

Hoops, Bands and Cotton Ties.—Consumers are pretty well covered over the remainder of this year and are specifying freely against contracts. The new demand is fair, but the mills are filled up for two or three months ahead and shipments are heavy. The growing scarcity in steel billets and higher prices will probably mean an advance in hoops and bands in the near future. We quote steel hoops at 1.30c. to 1.40c.; bands, 1.30c. to 1.35c., for delivery over remainder of the year. Only on very desirable orders are the lower prices made. Cotton ties are quoted at 86c. per bundle for September delivery, but the season is over.

Iron and Steel Bars.—Heavy inquiries for steel rounds for shrapnel are still coming into this market, but local mills are not able to do much with them, having their product sold up for the remainder of the year. It is stated that one order for 40,000 tons of steel rounds was placed with a local mill in the past week, and prices now being quoted are 2.25c. to 2.50c. and higher. The steel-bar mills are full of work for practically the remainder of the year, and specifications are coming in freely, being more active from the implement trade in the past week or two than for some time. On some sizes of steel bars, the mills are back in deliveries eight weeks or longer. We quote steel bars at 1.30c. to 1.35c. for third quarter, but the lower price has about disappeared. Common iron bars are higher and we now quote these at 1.35c.; refined iron bars, 1.40c. to 1.45c., and railroad test iron bars, 1.45c. to 1.50c., all f.o.b. Pittsburgh.

Carwheels.—All the makers of carwheels have their capacity sold up for some time ahead and are very much back in deliveries. Prices are firm but no higher. We quote standard 33-in. freight carwheels, 6¼-in. rough bore, at $16, and standard 36-in. passenger, the same bore, at $22.50 per wheel, f.o.b. Pittsburgh.

Nuts and Bolts.—This trade is very active, and makers say they have their output sold up for the next two or three months and consumers are specifying heavily against contracts. Owing to the higher prices for steel, it is not unlikely there will be an advance in nuts and bolts in the near future. Discounts to the large trade are as follows:

U. S. S. Cold Punched Blank and Tapped, Chamfered, Trimmed and Reamed

½ in. and smaller, hex.....7.4c. per lb. off
⅝ in. and larger, hex.....6.9c. per lb. off
Square, all sizes .....5.5c. per lb. off

Semi-Finished Tapped

½ in. and smaller, hex.....85-10-5 off
⅝ in. and larger, hex.....85-5 off

Black Bulk Rivets

7/16 x 6½, smaller and shorter.....80-10 off

Package Rivets 1000 Pcs.

Black, metallic tinned and tin plated....75-10-10 off

Discounts on bolts to the large trade, are as follows:

Machine bolts, h. p. nuts, ⅜ x 4 in., smaller and shorter, rolled, 75, 10, 10 & 10; smaller and shorter, cut, 75, 10, 10 & 5; larger or longer, 75 & 10. Machine bolts, C. P. C. & T. nuts, ⅜ x 4 in., smaller and shorter, 75, 10 & 7½; larger or longer, 70, 10 & 7½. Common carriage bolts, ⅜ x 6 in., smaller and shorter, rolled, 75, 10, 10 & 5; smaller and shorter, cut, 75, 10 & 10; larger or longer, 75 & 5. Bolts without nuts, 6 in. and shorter, extra 10; longer lengths, extra, 5. Blank bolts, 75 & 10. Bolt ends with h. p. nuts, 75 & 10; C. P. C. & T. nuts, 70, 10 & 7½. Gimlet point coach screws and cone point lag screws, 80 & 15. Nuts, blank or tapped, h. p. square, 6c. lb. off; h. p. hexagon, 6.70c. lb. off; C. P. C. & T. square, 5.50c. lb. off; hexagon, ⅝ in. and up, 7c. lb. off; smaller, 7.50c. lb. off; C. P. plain, square, 5.40c. lb. off; hexagon, 5.80c. lb. off; C. P. semi-finished, hexagon, ⅝ in. and up, 85 & 10; smaller, 85, 10 & 10.

Shafting.—The makers of shafting say that present conditions are more active than at any time in more than two years. A good deal of shafting is going to makers of war munitions, and the screw stock users are buying heavily, while specifications from the automobile trade are very active. Several makers of shafting say that up to Sept. 1 they had furnished as much product to the automobile trade this year as in all of last year. Most consumers are covered by contracts placed some time ago, when prices were lower, and the orders now being placed are for small lots for consumers who did not buy heavily enough and find they are running short. On new orders, discounts on cold-rolled shafting are 64 per cent off in carloads, and 59 per cent in less than carloads, f.o.b. Pittsburgh.

Merchant Steel.—The new demand is active, and the larger consumers are specifying freely against contracts. Two local mills state that shipments in August were the heaviest in any one month for more than two years. Prices are firm and likely to be higher before long. On small lots we quote: Iron finished tire, ½ x 1½ in. and larger, 1.60c. base; under ½ x 1½ in., 1.75c.; planished tire, 1.80c.; channel tire, ¾ to ⅞ and 1 in., 2.10c. to 2.20c.; 1 x ⅛ in. and larger, 2.20c.; toe calk, 2.20c. to 2.30c. base; flat sleigh shoe, 1.95c.; concave and convex, 2c.; cutter shoe, tapered or bent, 2.50c. to 2.60c.; spring steel, 2.20c. to 2.30c.; machinery steel, smooth finish, 2c.

Wrought Pipe.—This is always the slack season in the pipe trade, and the present demand for both merchant pipe and oil country goods is dull. The advances in prices of crude oil have not been reflected in any increase in demand for casing or oil well supplies. The order for the J. G. White Corporation of New York City for 120 miles of 8-in. pipe has not yet been placed, but may come out this week. Reports are that a large local steel company is about to go into the manufacture of pipe on a large scale and will make all sizes up to 20-in. Prices on galvanized pipe are firmer, due to the higher market for spelter. Discounts on black iron and steel pipe are only fairly well observed.

Boiler Tubes.—There is not much new demand, as consumers covered some time ago, but are not specifying very freely against contracts. Discounts on both iron and steel tubes are more or less shaded.

Old Material.—The local scrap market has been quiet the past week, in marked contrast to the great activity prevailing for two or three weeks previous. Consumers are pretty heavily stocked and are out of the market for the time being, waiting to see whether the higher prices are going to hold. It is stated that very little heavy melting scrap was sold above $14.50 during the recent activity, most of the sales being at $14 to $14.25, delivered. A sale of 1500 tons of bundled sheet scrap is reported at $12 per gross ton, delivered to consumer's mill, and a sale of about 350 tons of borings at $3.75, delivered. Prices are firm, but unchanged from last week. Dealers quote for delivery in the Pittsburgh and nearby districts that take the same rates of freight, as follows, per gross ton:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery	$14.00 to $14.50
Compressed side and end sheet scrap.	13.00 to 13.25
No. 1 foundry cast	13.00 to 13.25
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	11.75 to 12.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	14.25 to 14.50
No. 1 railroad malleable stock	12.25 to 12.50
Railroad grate bars	8.75 to 9.00
Low phosphorus melting stock	17.25 to 17.50
Iron car axles	18.50 to 19.00
Steel car axles	16.00 to 16.50
Locomotive axles, steel	19.75 to 20.25
No. 1 busheling scrap	11.75 to 12.00
No. 2 busheling scrap	8.75 to 9.00
Machine shop turnings	8.75 to 9.00
Old carwheels	13.00 to 13.50
Cast-iron borings	9.50 to 9.75
*Sheet bar crop ends	13.50 to 14.00
Old iron rails	12.75 to 13.00
No. 1 railroad wrought scrap	13.00 to 13.25
Heavy steel axle turnings	10.25 to 10.50
Heavy breakable cast scrap	12.50 to 12.75

*Shipping point.

Coke.—The local market on coke is very dull and it has failed utterly to respond to the improved conditions in pig iron. While the output of coke has increased heavily in the past month or more, the larger product is going to steel works blast furnaces that have their own ovens and do not buy coke in the open market. It is a fact, too, that by-product coke is making serious inroads into the consumption of beehive coke and will still further decrease the consumption of such coke in the future. The LaBelle Iron Works, Steubenville, Ohio, has just placed a contract for 94 Koppers by-product ovens. No large inquiries are in the market at present for either furnace or foundry coke. We quote standard makes of blast-furnace coke at $1.50 to $1.60 for prompt shipment, and $1.75 to $1.85 on contracts for the remainder of the year; standard makes of 72-hr. foundry coke, $2 to $2.25 for prompt delivery and $2.25 to $2.50 on contracts for remainder of the year, all per net ton at oven. The Connellsville *Courier* reports the output of coke in the upper and lower Connellsville regions for the week ended Aug. 21 as 382,606 net tons, an increase over the previous week of 8193 tons.

Chicago

CHICAGO, ILL., Sept. 1, 1915.—(*By Wire.*)

One of the first evidences of interest from the railroads in their general steel requirements was disclosed last week in the unheralded placing of contracts by the Chicago, Milwaukee & St. Paul, covering the same tonnage as that of last year. An inquiry from the Atchison, Topeka & Santa Fe suggests a similar awakening. Undoubtedly the mills have made representations indicating their inability to accommodate the railroads if their needs, too long delayed in placing, are crowded out by export tonnage that is even now clamoring for acceptance. Already a beginning has been made of rolling large bars on the rail mills, and an extension of this program is contemplated. Bar tonnage placed last week ran into large figures. The call for track fastenings is also unceasing, and quotations have been advanced. Higher prices are being named for blue annealed and box annealed black sheets, the erratic course of galvanized is again tending upward, fence and shafting are up a point, and makers of iron bars see in the cost of scrap and the price of steel bars an occasion for advancing their quotations. An order for 2500 tons of steel, in which the specifications covered plates, shapes and bars, placed last week at 1.35c., Pittsburgh, is illustrative of the strong position of the market, notwithstanding plates may be had for slightly less. The disposition to buy pig iron continues pronounced. The malleable interests in particular are in the market for an aggregate which, if placed, will close the books of furnaces now in blast for the remainder of this year. Activity in old material has likewise been noticeably curtailed.

Pig Iron.—Buyers of pig iron continue to display an alert interest in the market. Tonnage closed last week rounded out a very substantial quantity, and practically as much is still under consideration. A feature of the inquiry is the proportion calling for delivery of iron this year. Of an aggregate of about 12,000 tons, made up of lots of 1000 tons and over, by far the largest proportion is for fourth quarter shipment, so that if contracts are taken out in full some of the sellers are very close to being filled up for the year. It is in this connection that the outlook can be viewed with least assurance. There is no mistaking the eagerness to cover, with which buyers generally have been inspired by conditions in the iron and steel market, but it is not certain that the melt for the remainder of the year will call for all the iron for which contracts have been made. For fourth quarter delivery Northern iron running 1.75 to 2.25 per cent in silicon is selling quite uniformly on the basis of $13.50 at the furnace and for the first quarter at $14. For higher silicon irons, of which there have been several purchases, prices are somewhat irregular. One sale of 3 per cent silicon was placed at $15, delivered Chicago switching district, which was approximately $1 under competitive quotations. Quotations for Southern iron range from $11 to $11.50, Birmingham, for delivery this year, but very little is to be had at the lower figure. Sales are noted at $11.25 and $11.50. The persistence of the present level of prices, particularly for Lake iron, would seem to be a significant contrast to the very general talk of advances of $1 and $2 per ton still to be expected. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 2 to 5	$16.25 to $16.75
Lake Superior charcoal, No. 1	16.75
Lake Superior charcoal, No. 6 and Scotch	17.25
Northern coke foundry, No. 1	14.00 to 14.50
Northern coke foundry, No. 2	13.50 to 14.00
Northern coke foundry, No. 3	13.25 to 13.50
Southern coke, No. 1 f'dry and 1 soft	15.50 to 16.00
Southern coke, No. 2 f'dry and 2 soft	15.00 to 15.50
Malleable Bessemer	13.50 to 14.00
Standard Bessemer	17.25
Basic	13.25 to 13.75
Low phosphorus	20.00 to 20.50
Silvery, 8 per cent	19.00 to 19.25
Silvery, 10 per cent	19.50 to 19.75

(*By Mail*)

Rails and Track Supplies.—The course the railroads may take regarding their rail purchases, which have thus far been so much below normal, is presenting a problem of some importance to the mills. The opportunity of fully engaging their capacity with orders for steel in other forms, if accepted, would make extremely difficult an eleventh-hour rolling of rails. For the present there is practically no rail business. Specifications covering spikes and bolts are extraordinarily large in contrast, and the bookings of the week cover a round tonnage. Minimum prices for spikes and bolts have been advanced $1 per ton and for tie plates $2 per ton. An additional order for spikes for Russia was placed last week. We quote standard railroad spikes at 1.65c., base; track bolts with square nuts, 2.05c. to 2.10c., base, all in carload lots, Chicago; tie plates, $30, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, 1.25c., base, open hearth, 1.34c.; light rails, 25 to 45 lb., 1.07c.; 16 to 20 lb., 1.12c.; 12 lb., 1.17c.; 8 lb., 1.22c.; angle bars, 1.50c., Chicago.

Structural Material.—The week brought out two notably significant transactions in the covering by the Chicago, Milwaukee & St. Paul Railroad for its requirements of steel in various forms in the same amount as last year and the booking by a local mill of an order of 2500 tons made up of plates, shapes and bars on the basis of 1.35c., Pittsburgh. The former instance is the first important display of interest on the part of a large railroad in its general steel requirements, and the latter is an enlightening evidence of the strength of the market. Specifications continue to run strongly, but new business is of a miscellaneous character. Outstanding car inquiries are limited to the 1000 for the New York Central Lines, 500 for the Santa Fe and 100 for the Anaconda Copper Company, but in the expected inquiry from the Illinois Central for 4000 cars a substantial tonnage of steel will be involved. Fabricators in this territory are taking a little more business, but at prices too low to warrant the cutting of stock lengths, which places them, in view of mill deliveries of five to six weeks, in something of a predicament. Among the contracts placed last week for fabricated steel, the award to the Pan-American Bridge Company of 882 tons for additions to the Haynes automobile plant was the largest. The American Bridge Company took 450 tons for St. Paul track elevation and sub-station construction. A. Bolters' Sons received a small contract for a school building, and the Western Iron Works 284 tons for a college at San Francisco. We quote for Chicago delivery of plain shapes from mill 1.539c.

The volume of store business pronouncedly reflects the condition of delay incident to mill deliveries, and sales are notably heavier. We quote for Chicago delivery of structurals out of store 1.85c.

Plates.—The inside price for plates is still about $2 per ton below the market on shapes and bars, but this minimum represents the position of exclusive plate mills rather than that of mills able to accept mixed specifications of plates, shapes and bars in a full range of sizes. As noted above, plates have been booked at a price as high as 1.35c., Pittsburgh, although 1.25c. can still be done. We quote for Chicago delivery of plates from mill 1.439c. to 1.539c.

We quote for Chicago delivery of plates out of stock 1.85c.

Sheets.—The relief which accompanied the slump in spelter prices was short lived. Although some mills are still quoting 3.60c., Pittsburgh, for No. 28 galvanized, a withdrawal of this quotation seems imminent, for, with spelter at 16c., a corresponding price for No. 28 gage would approach 4c. Those mills which prior to the decline in spelter were out of the market have resumed the same attitude, and buyers show little or no disposition to venture purchases. A slight improvement in the demand for black sheets is reported, and prices are up $1 per ton. Blue annealed sheets are decidedly firm at 1.40c., Pittsburgh, with further advances predicted. We quote for Chicago delivery from mill, No. 10 blue annealed, 1.589c. to 1.639c.;

No. 28 black, 2.039c. to 2.089c.; No. 28 galvanized, 4.789c. to 4.939c.

Store prices for sheets have been adjusted to recent conditions and we quote for Chicago delivery from jobbers' stock as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed, 2.05c.; No. 28 black, 2.55c. to 2.65c.; No. 28 galvanized, 4.35c.

Bars.—The market presents an entanglement of inquiry for bars to go into export products which offers increasingly large tonnages for consideration, though frequently accompanied by a prohibitive lack of authority. One order for 70,000 tons is, however, representative of what the situation holds. It would not be surprising to find the operations of rail mills brought up to capacity through the rolling of these larger size bars. There is little improvement in bar-iron tonnage, but the advance in the price of scrap and the spread which has developed between iron and steel bars, both with respect to price and delivery, lead to an expectation of an early advance. A round tonnage of billets and sheet bars for export was placed in the week. We quote for mill shipment as follows: Bar iron, 1.25c.; soft steel bars, 1.539c.; hard steel bars, 1.30c. to 1.35c.; shafting, in carloads, 65 per cent off; less than carloads, 60 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 1.75c.; bar iron, 1.75c.; reinforcing bars, 1.75c. base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 54 per cent off.

Rivets and Bolts.—Specifications for bolts from the railroads and agricultural implement interests are very substantial, a single order from an agricultural concern, last week, exceeding 1,000,000 pieces. Prices are still materially below the nominal level of quotations. Rivet sales have only a minor importance in the market. We quote as follows: Carriage bolts up to ⅝ x 6 in., rolled thread, 80-10; cut thread, 80-5; larger sizes, 75-15; machine bolts up to ⅝ x 4 in., rolled thread, with hot pressed square nuts, 80-15; cut thread, 80-10; larger sizes, 80; gimlet point coach screws, 85; hot pressed nuts, square, $6 off per cwt.; hexagon, $7 off per cwt. Structural rivets, ¾ to 1¼ in., 1.75c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 1.95c.; boiler rivets, 2.05c.; machine bolts up to ⅝ x 4 in., 75-15; larger sizes, 70-10-10; carriage bolts up to ⅝ x 6 in., 75-10; larger sizes, 70-15 off; hot pressed nuts, square, $6, and hexagon, $6.70 off per cwt.

Wire Products.—The usual clearing up of order books in the matter of old contracts has followed upon the announcement of an advance a week ago, and specifications of the last several days represent a brisk trade. An advance of one point in fence is announced to the trade to-day. We have revised our quotations and quote to jobbers, per 100 lb., as follows: Plain wire, No. 9 and coarser, base, $1.689; wire nails, $1.839; painted barb wire, $1.989; galvanized barb wire, $2.689; polished staples, $1.989; galvanized staples, $2.689, all Chicago.

Cast-Iron Pipe.—An advance of 50c. per ton for cast-iron pipe up to 16 in. and of $1 per ton in the larger sizes follows the higher prices for pig iron, although pipe business is of very moderate proportions. The award to be made at Chicago Sept. 10, involving 2000 tons, is the most important municipal letting in sight. At Craig, Col., 400 tons is to be bought. The leading interest is the low bidder for the 30-in. and 36-in. pipe at Minneapolis, the American Cast Iron Pipe Company being low on about 175 tons of 24-in. At Maumee, Ohio, an award has been made to a contractor of the 800 tons for which bids were received last week. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $26.50; 6 in. and larger, $24.50, with $1 extra for class A water pipe and gas pipe.

Old Material.—The week in the scrap market has been one of negative importance. Such transactions as have been brought to a head indicated a willingess on the part of sellers to accept such prices as they could get, but, in general, quotations are about as last quoted. Railroad offerings of last week continue to command a premium over sales prices to consumers, a spread which represents the speculative phase of the market. The only railroad list of importance now out for figures is that of the Chicago & Northwestern, which aggregates about 6000 tons. We quote for delivery at buyer's works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$12.25 to $12.50
Relaying rails	19.50 to 20.50
Old carwheels	11.75 to 12.00
Old steel rails, rerolling	13.50 to 14.00
Old steel rails, less than 3 ft.	12.25 to 12.75
Heavy melting steel scrap	11.75 to 12.25
Frogs, switches and guards, cut apart	11.75 to 12.25
Shoveling steel	11.50 to 12.00
Steel axle turnings	8.75 to 9.00

Per Net Ton

Iron angles and splice bars	$13.50 to $13.75
Iron arch bars and transoms	13.75 to 14.25
Steel angle bars	10.75 to 11.25
Iron car axles	15.50 to 16.00
Steel car axles	14.75 to 15.25
No. 1 railroad wrought	11.00 to 11.50
No. 2 railroad wrought	10.75 to 11.00
Cut forge	10.50 to 10.75
No. 1 busheling	9.25 to 9.75
No. 2 busheling	7.25 to 7.75
Pipes and flues	8.75 to 9.25
Steel knuckles and couplers	10.75 to 11.25
Steel springs	10.75 to 11.25
No. 1 boilers, cut to sheets and rings	8.25 to 8.50
Boiler punchings	10.00 to 10.50
Locomotive tires, smooth	11.00 to 11.50
Machine shop turnings	6.75 to 7.00
Cast borings	6.00 to 6.50
No. 1 cast scrap	10.00 to 10.50
Stove plate and light cast scrap	8.75 to 9.00
Grate bars	8.50 to 8.75
Railroad malleable	10.25 to 10.75
Agricultural malleable	9.00 to 9.50

Philadelphia

PHILADELPHIA, PA., Aug. 31, 1915.

The general aspect of the market is unchanged. Quotations for prompt deliveries continue strong, and the reluctance of sellers to quote into next year, and in some cases into the fourth quarter, is possibly a little stronger. The shortage in steel is still a prime factor, and now extends to Bessemer steel more than it did. The railroads are buying but little and, if they were inclined to buy rails, would have difficulty in getting early deliveries. The demand for steel rounds for shells is constantly assuming greater proportions, one new inquiry from France calling for 60,000 tons. There is a growing tendency to say less of the war demand. Plates, shapes and bars are strong at 1.509c., Philadelphia, and there is a continued disinclination to quote into next year. The buying of foundry pig iron keeps up in good volume, but individual lots are small and melters are trying to buy as far ahead as they can. Steel-making iron is extremely strong, and is held at high prices which have not yet been fully tested. In furnace coke there have been further transactions of good size. Old materials are firm and active, and apparently are becoming scarce.

Pig Iron.—Buying of foundry irons has been general except in the case of the stove makers with whom business is flat. Altogether a good tonnage is moving, but it is noted that few individual sales involve over 500 tons. Most consumers want to buy into next year, but the furnaces and their representatives continue their policy of discouraging deliveries too far ahead. Consumers are unquestionably well covered for this year. The quotations continue firm and those of producers who are well sold up for the year are particularly stiff. Eastern Pennsylvania furnaces whose products take freight rates to consumers of approximately 80c. continue to quote $15 at furnace, though the sellers say they regard their prices as too low. The Norfolk & Western Railroad is inquiring for about 4000 tons, including 300 tons of charcoal, 1200 tons of malleable, 450 tons of special analyses and 2000 tons of Nos. 1, 2 and 3 irons. Virginia irons are stronger. One maker has announced the following schedule of quotations, at furnace, for deliveries in the first quarter, or first half, of next year: No. 2X, $14; No. 2 plain, $13.50; No. 3, $13.25, and No. 4 and gray forge, $13. Delivery to this territory takes a freight rate of $2.75. A representative Virginia furnace reports that

shipments increased, both in number and size, to such an extent last week that they exceeded production. Though a large consumer of basic has been watching the market closely for some days, and must soon come in for 1916 requirements, there has been no business involving any large lots. A sale has been made here, for prompt shipment, at $17 delivered, but probably not much over 1000 tons was involved. A Bridgeport, Conn., interest, which purchased several thousand tons, possibly 12,000, is said to have paid $17, or more, delivered. Sellers of standard low phosphorus are quoting $24 to $25, delivered, but the last actual transaction was at $23.75. Makers of Lebanon low phosphorus are asking $20 at furnace, and a small lot has been sold at that price. Quotations for standard brands, delivered in buyers' yards, shipment ranging from third quarter to last half, range about as follows:

Eastern Penna., No. 2 X foundry	$15.50 to $16.00
Eastern Penna., No. 2 plain	15.25 to 15.75
Virginia, No. 2 X foundry	15.75 to 16.25
Virginia, No. 2 plain	15.50
Gray forge	15.00
Basic	16.50 to 17.00
Standard low phosphorus	23.75

Iron Ore.—An eastern Pennsylvania furnace has purchased 50,000 tons of New York State 65 per cent concentrate at 7⅛c. per unit, delivered. Arrivals of foreign ore in the week ended Aug. 28 consisted of 9450 tons from Cuba, 7157 tons from Sweden and 5300 tons from Chile, all under old contracts. The Swedish ore vessels are taking return cargoes of coal.

Ferroalloys.—Representatives of English makers of 80 per cent ferromanganese continue to quote $100, seaboard, for future deliveries which are contingent on the ability to obtain shipments and various other restrictions. The quotations for 50 per cent ferrosilicon range from $73 to $75, Pittsburgh, depending on quantity.

Bars.—Specifications continue at a good rate, and there is a fair volume of new business up to the end of this year. The quotation on steel bars for prompt shipments is strong at 1.509c., Philadelphia. Sellers are avoiding contracts for deliveries beyond the end of the year. The demand for shrapnel rounds has continued to grow, and orders covering thousands of tons have been placed, of which eastern Pennsylvania mills got their share. A French inquiry calls for 60,000 tons. Iron bars are firm at 1.459c. to 1.509c., Philadelphia.

Plates.—The market continues strong at 1.509c., Philadelphia, and the chief problem of the makers is making deliveries. Seven weeks is the time required by one mill. On small lots 1.559c. has been obtained. A few contracts have been entered with old customers for delivery in the last quarter at 1.609c. The locomotive business is promising for a continuance of demand from that quarter.

Structural Material.—The flow of orders and specifications is undiminished, and the market is strong at 1.509c., Philadelphia, on large shipments, and 1.559c. on small lots. It is reported that 600 tons for the superstructure of the McKean Street municipal pier, this city, will be supplied by the American Bridge Company. To date, the award has not been made on 2200 tons required by a Pennsylvania Railroad pier at Greenville, N. J., but it is expected that the McClintic-Marshall Company will supply the steel. The Pennsylvania and other railroads continue to order small bridges, one of which, to be erected at Camden, was awarded to the Eastern Steel Company. The Phoenix Iron Company will furnish 800 of 1000 tons required for a building for the Textile Machinery Company, Reading, Pa. New propositions continue to appear, one of which is a hospital in West Philadelphia.

Sheets.—An eastern Pennsylvania maker of plates quotes 1.759c., Philadelphia, for No. 10 blue annealed, delivery this year.

Billets.—Inquiry is heavy, especially for forging billets. While $32, Philadelphia, is still quoted on rolling billets, less probably could be done. Forging billets have been sold at $36, delivered. The shortage of steel still exists, although some Western billets have been offered here in addition to sales already made. The Graham Land & Improvement Company, Graham, Va., is seeking quotations on billets to turn out 20,000 tons of steel bars, delivery to be scattered over several months, until a maximum of 2000 tons per month is reached. Walter Graham, president of the company, states that it has leased a rolling mill at Roanoke, Va. Local sellers are unable to quote on the inquiry.

Coke.—Quotations on prompt deliveries are weak, but there is a pronounced tendency toward strength in futures. An eastern Pennsylvania furnace has contracted for the delivery of 5000 tons per month through the first half, at a price which is not stated, but believed to be low. Prompt furnace is quoted at $1.60 per net ton at oven, and contract up to Jan. 1 at $1.75 to $2. Prompt foundry is quoted at $2.20 to $2.60 per net ton at oven, and contract at about the same range. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—The market is strong and active, with a growing scarcity of some materials. The latter can be traced to the disposition of producers and dealers to hold for better prices. Sales of choice heavy melting steel have been made at $15. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$14.25 to $14.75
Old steel rails, rerolling	15.00 to 15.50
Low phos. heavy melting steel scrap	18.00 to 19.00
Old steel axles	19.00 to 20.00
Old iron axles (nominal)	22.00 to 23.00
Old iron rails	18.00 to 19.00
Old carwheels	13.50 to 14.00
No. 1 railroad wrought	16.00 to 16.50
Wrought-iron pipe	14.25 to 14.75
No. 1 forge fire	11.00 to 11.50
Bundled sheets	11.00 to 11.50
No. 2 busheling	9.50 to 10.00
Machine shop turnings	10.50 to 11.00
Cast borings	10.50 to 11.00
No. 1 cast	14.00 to 14.50
Grate bars, railroad	10.50 to 11.00
Stove plate	10.50 to 11.00
Railroad malleable	10.50 to 11.00

Johnson, Sharp & Co. have opened an office in the Commercial Trust Building, Philadelphia, to conduct a business as merchants and dealers in iron and steel, scrap material, coal and coke. They have been incorporated, with George T. Johnson, president, and Sydney T. Sharp, secretary and treasurer.

Cleveland

CLEVELAND, OHIO, Aug. 31, 1915.

Iron Ore.—Several sales are reported in lots up to about 40,000 tons. While there is still some inquiry in the market, it is believed that the season's buying is nearly over. Lake shipments are heavy and the vessel carrying capacity will be crowded for the remainder of the season to get down the ore that has been sold. The vessel tonnage is practically all tied up until the close of navigation and ore firms expect some trouble in securing boats to carry any ore that is sold from now on. We quote prices as follows, delivered to lower lake ports: Old Range Bessemer, $3.75; Mesaba Bessemer, $3.45; Old Range non-Bessemer, $3.00; Mesaba non-Bessemer, $2.80.

Pig Iron.—The market has quieted down somewhat, but prices are very firm. We note the sale of two lots of Bessemer iron by a Cleveland interest for delivery in the Pittsburgh district, one of 500 tons and one of 800 tons, at $16 at furnace for delivery in the last quarter. Standard low-phosphorus iron has advanced 50c. per ton, to $23, on a sale of 600 tons by the same interest. Valley furnaces are booking a fair volume of foundry iron for first half delivery at prices ranging from $14.50 to $15 for No. 2, the former being the ruling price for the last quarter. Local quotations are unchanged at $15 for any delivery, but this might be shaded slightly for early shipment. One Lake furnace is still making a $14 price for shipment to some points. Southern iron is quiet, with price unchanged at $11.50, Birmingham, for last quarter. It is probable that this price can be shaded 25c. for early shipment. Shipments on foundry-iron contracts show some improvement. Conditions have improved recently with

foundries making heavy castings and with some others engaged in jobbing work that have not been running full. We quote, delivered Cleveland, as follows:

Bessemer	$16.65 to $16.90
Basic	15.00 to 15.30
Northern No. 2 foundry	15.00 to 15.30
Southern No. 2 foundry	15.50
Gray forge	14.75
Jackson Co. silvery 8 per cent silicon	18.12
Standard low phos., Valley furnace	23.00

Coke.—The market is not active. Some consumers who would like to contract for their blast-furnace coke for delivery into next year were not able to do so at satisfactory prices. Foundry coke shipments are good but there is little new demand. We quote standard furnace coke at $1.55 to $1.65 per net ton at oven for prompt shipment and around $1.75 to $1.85 for the last quarter. Foundry coke is quoted at $2.25 to $2.75 for standard makes.

Finished Iron and Steel.—Steel-bar specifications are very heavy and mills could book a great deal of additional business, were they able to make the desired deliveries. The market has stiffened up, the only important independent interest that has adhered to the 1.30c., Pittsburgh, price since the recent advance having marked up its price to 1.35c. this week on steel bars, plates and structural material. A Cleveland buyer of steel for export has placed an order with a Youngstown steel interest for 50,000 tons of steel bars for shipment to France, deliveries to extend through the first half of next year. Several manufacturers in this territory are still figuring on steel forgings for 3-in. shells. It is understood the inquiry for these forgings comes from a Philadelphia company which is reported to have 2,000,000 shells, being a portion of a Russian contract for 12,000,000 shells. A new inquiry from a Cleveland buyer for 25,000 tons of painted barb wire for export is pending, and this, with other barb wire inquiries in the market, runs the total to over 100,000 tons. The demand is so urgent that it is stated that foreign governments will take any kind of barb wire. Mills, however, are sold up for the remainder of the year and efforts have been made to secure some barb wire from jobbers' stocks, but apparently without success. Prices on galvanized wire have been advanced $2 per ton for coarse sizes and $3 per ton for fine sizes because of the advance in spelter. Plates have stiffened up somewhat and the usual quotations now are 1.30c. to 1.35c., Pittsburgh. It is doubtful if the lower price can be shaded in this market. The sheet demand is fairly active and prices are firm, quotations on galvanized sheets having advanced. We quote sheets at 1.90c. for No. 28 black; 1.45c. to 1.50c. for No. 10 blue annealed, and 3.85c. for No. 28 galvanized. The structural situation is not active although fabricators are well filled with small work. Bids are being taken for an addition to the Hollenden Hotel, Cleveland, requiring 1200 tons. Bar-iron prices are firm at 1.20c., Chicago or 1.25c., Pittsburgh, for delivery in the Cleveland territory. Warehouse prices are 1.90c. for steel bars, except in 3-in. and larger sizes, and 2c. for plates and structural material.

Bolts, Nuts and Rivets.—Bolt and nut specifications are heavy and prices are firm. The demand for large bolts, which has not been very active, has improved. Rivet specifications are good and prices are firm. Current orders are being taken at 1.60c., Pittsburgh, for structural and 1.70c. for boiler rivets. Bolt and nut discounts are as follows: Common carriage bolts, ⅜ x 6 in., smaller or shorter, rolled thread, 75, 10, 10 and 5; cut thread, 75, 10 and 10; larger or longer, 75 and 5; machine bolts with h.p. nuts, ⅜ x 4 in., smaller or shorter, rolled thread, 75, 10, 10 and 10 per cent; cut thread, 75, 10, 10 and 5 per cent; larger and longer, 75 and 10; coach and lag screws, 80 and 15 per cent; square h.p. nuts, blank or tapped, $6 off the list; hexagon h.p. nuts, blank or tapped, $6.70 off; c.p.c. and t. square nuts, blank or tapped, $5.50 off; hexagon, ⅝-in. and larger, $7 off; 9/16 and smaller, $7.50 off.

Old Material.—The market is fairly active. Prices have been advanced on several grades and are very firm. Much of the trading at present is between dealers, the material going at higher prices than mills are willing to pay. A great deal of scrap is being held by producers and dealers for higher prices than are now prevailing. We note sales of heavy melting steel to Cleveland mills at $13. For Youngstown delivery, heavy melting steel is quoted at $14.50 to $14.75. Steel car axles have advanced sharply, being affected by the scarcity and high price of billets. Railroad lists out include the Pennsylvania, to close Sept. 3; Baltimore & Ohio, a large list, to close Sept. 8, and New York Central, to close Sept. 9. We quote, f.o.b., Cleveland, as follows:

Per Gross Ton

Old steel rails	$13.00 to $13.50
Old iron rails	14.00 to 14.50
Steel car axles	16.00 to 17.00
Heavy melting steel	12.75 to 13.00
Old carwheels	11.50 to 11.75
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	10.00 to 10.25
Railroad malleable	12.25 to 12.75
Steel axle turnings	10.00
Light bundled sheet scrap	10.00 to 10.50

Per Net Ton

Iron car axles	$17.25 to $17.75
Cast borings	7.25 to 7.50
Iron and steel turnings and drillings	6.25 to 6.50
No. 1 busheling	9.50 to 10.00
No. 1 railroad wrought	11.50 to 12.00
No. 1 cast	11.00 to 11.50
Railroad grate bars	9.00 to 9.50
Stove plate	8.75 to 9.00

Cincinnati

CINCINNATI, OHIO, Sept. 1, 1915.—(*By Wire.*)

Pig Iron.—The reluctance of Southern furnaces to open their books for next year's business contributes in a large measure to the dull period that the iron trade here is passing through. Practically all melters have covered for this year's requirements and quite a number have bought a sufficient quantity to run them well into the first quarter of next year. Some spot Southern iron is still obtainable at $11, Birmingham basis, but the majority of the furnaces are asking $11.50 for any shipment this year. A sale of 500 tons of low grade Southern was made to a Northern melter for fourth quarter delivery at $11.50 basis, Birmingham, for No. 2 foundry, and small lots of No. 2 have been taken by nearby consumers at the same rate. A few contracts for Southern iron are said to have been made on a basis of $12.50 for first half shipment, but the quantity involved is small. Northern furnaces are holding foundry, basic and malleable firm at $14, Ironton basis, for this year's shipment and $14.50 for the first half. Very little business is reported from any territory that can be reached by Hanging Rock producers and few future contracts are under negotiation. Indiana inquiries are out for a few small lots of Southern foundry for shipment in the next seven months. The International Steam Pump Company is inquiring for a large mixed lot of foundry iron for its different plants for first half shipment. There has been a slight let-up in the activity recently noted in Ohio silvery irons, which are now firmly held at $16.50 at furnace, based on an 8 per cent analysis. To sum up the situation, the market is simply a waiting one on the part of buyers and sellers. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$14.40 to $14.90
Southern coke, No. 2 f'dry and 2 soft	13.90 to 14.40
Southern coke, No. 3 foundry	13.40 to 13.90
Southern No. 4 foundry	12.90 to 13.40
Southern gray forge	12.40 to 12.90
Ohio silvery, 8 per cent silicon	17.76 to 18.01
Southern Ohio coke, No. 1	16.26 to 16.51
Southern Ohio coke, No. 2	15.26 to 15.51
Southern Ohio coke, No. 3	15.01 to 15.26
Southern Ohio malleable Bessemer	15.26 to 15.51
Basic, Northern	15.26 to 15.51
Lake Superior charcoal	16.20 to 17.20
Standard Southern carwheel	26.90 to 27.40

(*By Mail*)

Coke.—Little new contracting business is being done in either furnace or foundry coke. Many oven operators are not yet willing to sell furnace coke for future delivery. The blast furnaces and foundries are fairly well supplied to Jan. 1. Prompt shipment coke in the Connellsville district has stiffened considerably, as the

supply has been somewhat depleted by the large shipments on old contracts. We quote Connellsville 48-hr. coke for prompt shipment at $1.60 to $1.70 for nearby shipment and from $1.70 to $2 per net ton at oven for the last quarter. Foundry coke ranges from $2.25 to $2.65 for this year's shipment. Wise County and Pocahontas leading brands are held at figures ranging from 10c. to 20c. a ton higher than those named.

Finished Material.—The nearby rolling mills are now quoting around 3.75c., Pittsburgh basis, on No. 28 galvanized sheets. While this price was shaded last week, the resumed advance in spelter has been a factor in forcing the mills to mark up their quotations proportionately. Black sheets are quoted at 1.90c. to 1.95c., Pittsburgh basis. There is some new business for prompt shipment, but mostly for galvanized sheets. The mills are rather slow in taking on contracts for either black or galvanized sheets for any extended deliveries. The local warehouse price on No. 28 galvanized sheets is 4.50c., Cincinnati. Structural shapes are unchanged at 1.90c. to 2c., and steel bars, 1.85c. to 1.90c., for delivery from local stocks.

Old Material.—The advances made last week appear to be well maintained on all grades of scrap. Not much business has been transacted within the past few days as far as known, in either the buying or the selling end of the business. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices, f.o.b. at yards:

Per Gross Ton	
Bundled sheet scrap	$8.50 to $9.00
Old iron rails	12.00 to 12.50
Relaying rails, 50 lb. and up	20.25 to 20.75
Rerolling steel rails	10.50 to 11.00
Heavy melting steel scrap	10.50 to 11.00
Steel rails for melting	10.50 to 11.00

Per Net Ton	
No. 1 railroad wrought	$9.50 to $10.00
Cast borings	6.25 to 6.75
Steel turnings	5.75 to 6.25
Railroad cast scrap	10.25 to 10.75
No. 1 machinery cast scrap	11.50 to 12.00
Burnt scrap	7.50 to 8.00
Old iron axles	15.00 to 15.50
Locomotive tires (smooth inside)	9.75 to 10.25
Pipes and flues	7.25 to 7.75
Malleable and steel scrap	8.50 to 9.00
Railroad tank and sheet scrap	6.50 to 7.00

Birmingham

BIRMINGHAM, ALA., Aug. 30, 1915.

Pig Iron.—The market has grown stronger, owing to additional sales by the only interest with much iron to sell, a strict adherence all round to a minimum of $11 for spot iron, and the growing decrease of the available and prospective supply of metal as compared with the demand. The leading exclusive foundry iron maker sold 50 per cent over its make and likewise shipped the same quantity of metal as booked during the month. Still another, in spite of shortage on certain brands, oversold its make by 5000 to 7000 tons. The leading interest, after re-entering the market for spot and rest of the year, has booked a round tonnage for that period at the $11 minimum. A feature of recent sales has been 25c. to 50c. premium on lower grades. Carload lots are sold uniformly at $11.50. The Sloss-Sheffield Company, early in the past week, marked up spot to $11.25 and fourth quarter delivery to $11.50. The disposition of other makers is to follow its example. The Woodward Iron Company appears to be selling practically nothing except fill-in iron for regular customers, and, being still uncertain with regard to when an additional stack can be blown in, will probably continue to occupy that attitude a little while longer. Very little additional 1916 iron has been sold, but some sales have been made by the Tennessee Company, the only interest quoting for 1916, at its basis of $12.50. One of the largest operators says that books for 1916 will probably be opened this week, and he added that he would not quote under $12.50. The only factor which may count against further advances is the 75,000 tons or more of speculators' iron in the yards. Some of this, it is reported, is being offered at $11, but none lower. Speculators were again turned down the past week on firm offers of $11 and the additional sales made to the regular trade came without solicitation. It is understood that the Central Coal & Iron Company has completed arrangements for shipping iron and iron pipe down the Warrior River to Mobile by barges. The furnace and pipe works are immediately on the river banks and the freight rate is, therefore, a very low one, making coastwise and foreign movements especially feasible. The steel works are still operating at capacity and foundries are taking more iron than in some time. Reports of plans for an additional unit to the American Steel & Wire Company's plant at Fairfield are not confirmed. Industrial payrolls are the largest in the history of the district. The Sloss-Sheffield Company is now successfully making a high manganese iron of 0.75 and 1 per cent. We quote, per gross ton, f.o.b, Birmingham district furnaces, as follows:

No. 1 foundry and soft	$11.50 to $12.00
No. 2 foundry and soft	11.00 to 11.50
No. 3 foundry	10.50 to 11.00
No. 4 foundry	10.25 to 10.75
Gray forge	10.00 to 10.50
Basic	11.00 to 11.50
Charcoal	23.00 to 23.50

Cast-Iron Pipe.—It has been a featureless week in the pipe business. No large orders were received, but fill-ins aggregated a respectable total. The United States Company expects to resume operations at its enlarged Bessemer plant this week or very soon afterward. The demand for gas pipe is said to be encouraging. Prices are firm. The sanitary pipe makers report no improvement. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $21.50; 6-in., $19.50, with $1 added for gas pipe.

Coal and Coke.—The coke market is in a strong position, with the demand beginning to exceed the supply. Prices show a decided tendency to advance. The Sloss-Sheffield Company will resume at its old city beehive ovens if the consent of the authorities is obtained. Furnace companies have recently purchased from one another. Foundries are taking larger quantities of high-grade beehive make, both at home and in the Southwest and the far West. We quote, per net ton, f.o.b. oven, as follows: Beehive furnace, $2.75 to $3; beehive foundry, $3.25 to $3.50; by-product, $2.50 to $2.75. The coal trade has begun to experience a slight increase in demand, sufficient to justify some additional output. The Tennessee Company has completed physical arrangements for shipping coal to Mobile and New Orleans by barges via the Warrior River.

Old Material.—Dealers report no difficulty in obtaining higher prices. The problem now is to secure stocks. All steel scrap is quickly disposed of. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old iron axles	$13.50 to $14.00
Old steel axles	13.00 to 13.50
Old iron rails	12.50 to 13.00
No. 1 railroad wrought	9.50 to 10.00
No. 2 railroad wrought	8.50 to 9.00
No. 1 country wrought	8.50 to 9.00
No. 1 machinery cast	9.50 to 10.00
No. 1 steel scrap	9.50 to 10.00
Tram carwheels	9.50 to 10.00
Stove plate	8.00 to 8.50

St. Louis

ST. LOUIS, MO., Aug. 30, 1915.

Pig Iron.—Buying has continued active, but quantities have been small. More foundries are covering wants, but there is a disposition not to contract for first quarter and first half with sharp differences in price demanded for deliveries after Jan. 1. A larger proportion of sales have to await confirmation at the furnace. No. 2 Southern, in no case lower than $11, Birmingham, is set at $12.50 to $13 for 1916.

Coke.—No transactions of moment appeared. The local product from by-product sources is shutting out all but special brands.

Finished Iron and Steel.—Improvement in buying continues. Fabricators report increasing business, but it is as yet mostly for small jobs. Bars, both ordinary and reinforcing, are quite active. There are intimations that the railroads of this section will be in the market in a month or so for standard rails. Track fastenings are in good request, indicating that the rail-

roads are continuing to utilize material on hand. Buyers are paying the advanced figures freely. Movement out of warehouse continues active to fill immediate needs, and we quote for stock out of warehouse as follows: Soft steel bars, 1.80c.; iron bars, 1.75c.; structural material, 1.90c.; tank plates, 1.90c.; No. 10 blue annealed sheets, 2.10c.; No. 28 black sheets, cold rolled, one pass, 2.55c.; No. 28 galvanized sheets, black sheet gage, nominally 4.40c., but largely controlled by spelter conditions.

Old Material.—The market has lost some of its edge, but the tone is still firm. The notable thing, following a covering of short needs, is a slight cessation of the speculative tendency. Rerolling rails are scarce and stiffly held. Borings and turnings are rather sharply off, as a result of the large supplies coming out from war munitions plants. Shipments north and east of scrap continue profitable, while the local industries are a little hesitant to buy because of generally large stocks. With the coming of September considerable quantities of material are expected to come from the roads. We quote dealers' prices, f.o.b. customer's works, St. Louis industrial district, as follows:

	Per Gross Ton	
Old iron rails	$11.00 to	$11.50
Old steel rails, rerolling	12.50 to	13.00
Old steel rails, less than 3 ft.	11.50 to	12.00
Relaying rails, standard section, subject to inspection	21.00 to	23.00
Old carwheels	10.50 to	11.00
No. 1 railroad heavy melting steel scrap	11.50 to	12.00
Shoveling steel	9.50 to	10.00
Frogs, switches and guards cut apart	11.25 to	11.75
Bundled sheet scrap	6.50 to	7.00
	Per Net Ton	
Iron angle bars	$11.00 to	$11.25
Steel angle bars	10.00 to	10.50
Iron car axles	15.75 to	16.25
Steel car axles	12.50 to	13.00
Wrought arch bars and transoms	12.75 to	13.25
No. 1 railroad wrought	10.50 to	10.75
No. 2 railroad wrought	10.00 to	10.50
Railroad springs	10.00 to	10.50
Steel couplers and knuckles	10.25 to	10.75
Locomotive tires, 42 in. and over, smooth inside	10.25 to	10.50
No. 1 dealers' forge	8.50 to	8.75
Mixed borings	6.00 to	6.50
No. 1 busheling	9.00 to	9.50
No. 1 boilers, cut to sheets and rings	7.50 to	8.00
No. 1 railroad cast scrap	9.75 to	10.25
Stove plate and light cast scrap	7.75 to	8.25
Railroad malleable	8.75 to	9.00
Agricultural malleable	7.75 to	8.00
Pipes and flues	7.00 to	7.50
Railroad sheet and tank scrap	7.00 to	7.25
Railroad grate bars	7.00 to	7.50
Machine shop turnings	7.00 to	7.50

San Francisco

SAN FRANCISCO, CAL., Aug. 24, 1915.

Specifications on contracts are appearing a little more freely, owing to the continued upward tendency of prices and the apparent firmness of present freight schedules. Jobbing trade, however, remains quiet, and the absence of important new construction gives little encouragement as to the local situation. The brightest spot is the increase of export business, which is coming to be a really important item, with a great number of carload inquiries for scattered points in the Orient, in addition to some important single orders. Substantial orders for bars have already been taken by all the Pacific Coast and Western mills, and agents for mills on the Atlantic are figuring on plates, sheets, tin plate, cut nails, and miscellaneous wire products for export. Some difficulties are encountered in handling this business, due partly to lack of familiarity of American manufacturers with the new markets, and partly to reluctance to quote c.i.f. prices, with ocean freights in the present uncertain condition.

Bars.—A fair tonnage has been taken for local bridge and building work, but this demand is limited, and the movement of merchant bars is very light. Local mills are gradually filling up with foreign business. Prices for much of this are said to have been rather low so far, but inquiries are increasing and better values are expected. A sharp advance has already taken place, carload lots from mill being quoted at 1.85c.

Structural Material.—The market has lapsed into extreme dullness. The University job was finally awarded to the Pacific Rolling Mill Company, and the Palm Bridge & Iron Works, Sacramento, has taken a cell job on the Folsom prison. Plans are out for the Bishop Theater, Oakland, but aside from this there is nothing of importance in the market, and little even remotely in prospect. Supplies of plain material are being sorted up a little under old contracts, but there is no large buying.

Plates.—Some interest is taken in reports of additional shipbuilding contracts at local and northern plants, which would require a substantial tonnage. It is reported that the Shell Company will build two 2000-bbl. oil tanks near Coalinga, Cal. Miscellaneous tank work holds up fairly well. Many small foreign inquiries are appearing, and it is believed that a good-sized tonnage will be exported to the Orient during the fall.

Sheets.—The sharp decline on galvanized sheets is rather disappointing to merchants, who still have a fair tonnage purchased earlier in the season. The lower prices may stimulate the market somewhat, however, giving corrugated sheets their usual place in providing warehouse space for the crops. Current business in either galvanized or blue annealed is limited to small sorting-up orders. A number of foreign inquiries have appeared, especially for black sheets, but it is doubtful if much business has been closed. The local trade is closely following the upward movement of black and blue annealed.

Wrought Pipe.—The drop in galvanized has had little effect. Stocks are fair, but a good part of the tonnage was bought before the advance. The distributive movement is light, owing to the general dullness in building, though a little movement is taking place in scattered localities, and a fair country demand is expected next month. Some small water and gas works orders are appearing.

Cast-Iron Pipe.—Business is quiet, the only notable inquiry being one from Los Angeles for about 750 tons of small pipe, bids to be taken Aug. 27. Orders have been placed on the Pasadena and Santa Barbara inquiries, formerly mentioned. Prices at Pacific terminals have advanced $1 per net ton, being now $30 for 6-in., $32 for 4-in., and $1 extra for gas and class A water pipe.

Pig Iron.—The steady advance in the East has brought a little more interest on the part of local melters, some of whom have placed contracts covering requirements for six months, although current requirements are still very light. A shipment of nearly 500 tons of Chinese iron arrived Aug. 22, and a cargo from England, including 700 tons of pig iron and 1878 tons of coke, was received Aug. 13 by Balfour, Guthrie & Co. These light arrivals have little effect on the market, and spot offerings are firmly held. No. 1 Southern foundry is quoted at $21.50 to $22 per gross ton.

Coke.—While there is enough foreign coke on hand for current needs, the supply in dealers' hands is light, much of the arrivals being sold on contracts. Prices at the yards are accordingly firmly held at about $14 per net ton. While requirements are not large, numerous small shipments of Eastern and Southern coke are coming in, being valued here at $14 to $15 per net ton.

Old Material.—Some good-sized sales of steel melting scrap have been closed recently, at a general range of $7 to $9 per gross ton, though it is understood that little has been bought at the latter figure. Dealers are rather firm in their views, owing to the improved demand for finished material, but there is too much scrap available to permit of any great advance. A fair tonnage of cast scrap is being sold at the old range of $14 to $15 per net ton.

The largest ore cargo ever shipped from the Lake Superior district to Lake Erie was brought down a few days ago by the steamer W. P. Snyder, Jr., of the Shenango Steamship & Transportation Company. The cargo, which was loaded at Duluth, was 12,622 gross tons. It was unloaded at the Pennsylvania docks in Cleveland. The previous record-breaking cargo shipped to a Lake Erie port was 12,385 gross tons, brought down by the same freighter in July.

Buffalo

BUFFALO, N. Y., Aug. 31, 1915.

Pig Iron.—As a natural sequence of the rapid advance in prices of the past week or two in this district a slight falling off in the volume of buying has resulted. The total for all grades was about 15,000 tons for the week, as compared with about 50,000 tons for the previous week. The situation is very firm from the price standpoint and interest on the part of the consumer is still pronounced. Inquiries are chiefly for remainder of the year and first quarter of 1916, some of course being only for the purpose of ascertaining the price situation. The real strength of the market is evidenced by the fact that specifications are more freely made and increasing in volume from week to week and furnaces have made heavier shipments for the past week than for any week for a number of months. Prices rule firm at $14.50, furnace, minimum for any grade. No. 1 foundry is quoted at $14.75 to $15.25, and one furnace interest announces its lowest price as $15 for any grade to Jan. 1, and that it is not quoting at all for delivery after that date. The range of prices for the week, f.o.b. furnace Buffalo, is as follows, for delivery during the remainder of year and first quarter of 1916, except for basic which is quoted only for delivery to end of year:

No. 1 foundry	$14.75 to $15.25
No. 2 X foundry	14.75 to 15.00
No. 2 plain	14.50 to 14.75
No. 3 foundry	14.50
Gray forge	14.50
Malleable	14.75 to 15.00
Basic	15.75
Charcoal, regular brands and analysis	16.75 to 18.25
Charcoal, special brands and analysis	20.00 to 21.00

Later: It is expected that 50,000 to 75,000 tons of steel-making iron will shortly be placed.

Finished Iron and Steel.—The situation continues to be very strong both as regards demand and prices; 1.35c. Pittsburgh, is firmly held by all interests for bars, shapes and plates and it is suggested that bar material may show an advance to 1.40c. in the next month. Deliveries are becoming more extended and some mills are not in position to take any further business for delivery within the next three months. Other producers can promise first half of October for plates and shapes and some sizes of bars and the latter half of October for other sizes of bars. Orders for steel sheet piling aggregating 400 tons are reported for the week. In fabricated structural lines another quiet week is noted. Bids will soon be taken for 600 tons for the Furniture Exchange Building, Jamestown, N. Y.; also for 100 tons for a Y. M. C. A. building at Rochester. The F. L. Heughes Company, Rochester, has 100 tons for boiler house and laundry building for St. Mary's Hospital, that city.

Old Material.—The market continues strong, but there are indications that the present high level of prices will remain the maximum for some time, with the exception of cast scrap, old car wheels, iron rails and railroad malleable. These lines are due for an advance in keeping with the stiffening in price and increased activity in pig iron. Dealers are anticipating the market to some extent to sell at higher prices later. We quote dealers asking prices per gross ton f.o.b. Buffalo, as follows:

Heavy melting steel	$13.00 to $13.50
Low phosphorous steel	15.50 to 16.00
No. 1 railroad wrought scrap	12.00 to 12.50
No. 1 railroad and machinery cast	12.00 to 12.50
Old steel axles	16.00 to 16.50
Old iron axles	17.00 to 17.50
Old carwheels	12.00 to 12.50
Railroad malleable	12.00 to 12.50
Machine shop turnings	7.00 to 7.50
Heavy axle turnings	9.00 to 9.50
Clean cast borings	7.25 to 7.50
Old iron rails	14.00 to 14.50
Locomotive grate bars	9.00 to 9.50
Stove plate (net ton)	8.50 to 9.00
Wrought pipe	9.50 to 10.00
Bundled sheet scrap	8.50 to 9.00
No. 1 busheling scrap	9.00 to 9.50
No. 2 busheling scrap	7.50 to 8.00
Bundled tin scrap	11.00

The Dalton Machine Company, maker of bench lathes, etc., has removed from 108 East 129th Street to 1911 Park Avenue, New York.

British Market Quiet

Pig Iron Improved—Prices Lower on a Number of Finished Products

(*By Cable*)

LONDON, ENGLAND, Sept. 1, 1915.

Business in pig iron remains quiet, but the market is improved because of more favorable war news. There is but little export business and works are generally fully employed on government orders. Hematite iron is dull and rather easier at 96s. Tin plates are slack, makers quoting about 18s. 3d., and there is little prospect of improvement in export owing to severe government restrictions. Semi-finished steel is firm. Stocks of pig iron in Connall's stores were 141,840 tons at the close of last week against 140,884 tons one week previous. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 18s. 3d.

Cleveland pig iron warrants, 65s. 1½d., against 65s. 3d. last week.

No. 3 Cleveland pig iron, maker's price, f.o.b. Middlesbrough, 65s. 3d., compared with 65s. 6d. one week ago.

Steel black sheets, No. 28, export f.o.b. Liverpool, £11 15s.

Steel ship plates, Scotch, delivered local yards, £10, against £9 15s. a week ago.

Steel rails, export, f.o.b. works port, £8 17s. 6d.

Hematite pig iron, f.o.b. Tees, 96s., against 97s. last week.

Sheet bars (Welsh), delivered at works in Swansea Valley, £7 5s., compared with £7 10s. a week ago.

Steel joists, 15 in., export, f.o.b. Hull or Grimsby, £10 10s.

Steel bars, export, f.o.b. Clyde, £11 5s.

Ferromanganese, f.o.b., £20 15s.

Ferrosilicon, 50 per cent, c.i.f., £19.

New York

NEW YORK, Sept. 1, 1915.

Pig Iron.—Transactions are not as numerous as in the two weeks preceding but there is no change in producers' attitude as to prices, quotations generally being higher. The main interest in the East has been in basic iron where the tendency is to ask prices which are rather closely in line with the central Western market with freight to eastern points added. Sales amounting to several thousand tons of Southern iron have been made by holders of Southern speculative iron, these being in some cases at $11.50 Birmingham, for No. 2 foundry for spot delivery. The Buffalo market appears to be generally on a basis of $14.50 for No. 2 X, for this year, and $15 at furnace is now asked by some Buffalo producers for first quarter of 1916. Eastern Pennsylvania furnaces are asking from $15 to $16 at furnace for No. 2 X, according to delivery, the latter price being one producer's figure for 1916 iron. Coke is generally held at 40c. to 50c. above spot prices where 1916 delivery is involved, though only one transaction of any considerable size—8000 tons a month—is reported for next year. A sale of 12,000 tons of basic iron for delivery in the first half of 1916 in New England is reported at somewhat under $18 delivered. Thus far foundries in this district have been no more inclined than furnaces to take up seriously negotiations for next year. We quote at tidewater as follows for third quarter delivery: No. 1 foundry, $16 to $16.25; No. 2 X, $15.75 to $16; No. 2, plain, $15.50 to $15.75; Southern iron, $16 to $16.25 for No. 1 and $15.75 to $16 for No. 2.

Structural Material.—With promises of deliveries in eight and more weeks for some sizes of plain material, more is heard of new buying at 1.40c., Pittsburgh. Fabricators' prices are also improving in that they show a wider spread between high and low bids compared with conditions obtaining in public lettings of only a few weeks ago. No improvement has yet developed locally in building work, only a relatively small tonnage being covered by the projects closed. In railroad buying the Pennsylvania Railroad is conspicuous, as was forecasted last week. Some 3500 to 4000 tons have been placed by this road, upward of 2000 tons being awarded to the Pennsylvania Steel Company,

1300 tons to the Fort Pitt Bridge Works and 500 tons, this chiefly at North Philadelphia, to the American Bridge Company. Besides the 2200 tons for the Greenville, N. J., pier, the P. R. R. Lines East are also in the market for 1500 tons of bridge material. The Southern Railway has inquiries out for 500 tons. Among the industrial plant jobs pending is 500 tons for the Seneca Falls Mfg. Company, Seneca Falls, N. Y., and to the list of apartment houses yet to be placed may be added the Herzog apartment, East Eighty-second Street, 700 tons; the McMorrow apartment, Ninety-ninth Street and West End Avenue, 700 tons; the Tishman, East Seventy-ninth Street, 1000 tons, and the Macaro, West Fifty-eighth Street, 800 tons. The awards in addition to the Pennsylvania contracts embrace 750 tons for the Levy apartment, to the Hay Foundry & Iron Works; 500 tons for the McLaughlin loft, Thirty-sixth Street and 1000 tons for the Meyer apartment, Park Avenue and Sixty-third Street, both to the Hedden Iron Construction Company; 500 tons for a warehouse for Forstmann & Huffmann Company, Passaic, and 300 tons for the Winchester Repeating Arms Company, New Haven, both to the Levering & Garrigues Company; 200 tons for pier 29 North River to the Riter-Conley Mfg. Company and 200 tons for the Bosch Magneto works to the American Bridge Company. We quote mill shipments at 1.35c. to 1.40c., Pittsburgh, or 1.519c. to 1.569c., New York. For small lots from store we quote 2.05c. to 2.10c., New York.

Steel Plates.—Eastern mills have occasionally been offered a premium for a better delivery of plates than is generally promised, but so far these have been refused. Prices are strong at 1.35c., Pittsburgh. Railroad demand as represented in certain types of steel cars has not yet developed and car buying is still below expectations. We quote mill shipments of plates at 1.35c. to 1.40c., Pittsburgh, or 1.519c. to 1.569c., New York. Plates from store are 2.05c. to 2.10c., New York.

Iron and Steel Bars.—Owing to the extended nature of deliveries, increasing volumes of open-hearth bar demands are being satisfied with Bessemer steel. With deliveries 60 to 90 days distant, there is not much mill capacity for 1915 for sale, but a few companies are still in a position to make deliveries this year on fresh purchases of large rounds, even reserving something for domestic consumption. Specifications on contracts are for the maximum amounts obtainable. Export prices are strong and on ordinary bars a Pittsburgh base of 1.40c. is used together with all the extras commonly added in domestic business. Specifications on old contracts for bar iron are large like those of steel and buyers are desirous of covering for future deliveries. We quote mill shipments of steel bars at 1.35c., Pittsburgh, or 1.519c., New York, and refined iron bars, 1.469c., New York. Out of store in New York iron and steel bars are 2c. to 2.05c.

Ferroalloys.—The situation as to future supplies of ferromanganese from England is mixed. Instructions to New York representatives of British producers vary. In one case licenses for shipment in September are reported to be larger than for August, though these were very small indeed, while in other cases none is released at all, though the hope is held out that some may possibly be sent late in the month. At any rate receipts in September are sure to be very small because of the meager shipments in August, and those in October are not expected to be nearly as large as the average for the past three or four months. The metal to be received is practically all for delivery on contracts made some time ago. The nominal quotation is still $100, seaboard, but resale lots are said to be held for $135, seaboard. This price and even higher is expected to be obtained. Domestic producers, in the evident expectation of advancing prices, are not pressing sales. A domestic ferromanganese, averaging about 70 per cent manganese, has sold at $100. Brazilian ore is reported sold at 42c. per unit of manganese at seaboard, which is the highest price heard of thus far. More Cuban ore is expected to be available a little later. A new company operating near Santiago is mining a considerable quantity of a 43 to 47 per cent ore. A large producer of spiegeleisen is understood to be out of the market on the 19 to 21 per cent grade for delivery this year. A recent sale of 1000 tons is noted, but later a considerable quantity of the 16 to 19 per cent grade was taken up in lieu of the higher manganese metal. The nominal quotation for 19 to 21 per cent spiegel is $26 at furnace. Ferrosilicon, 50 per cent, is very active, the domestic demand reflecting the largely increased steel operations and the foreign demand being unusual in view of the cutting off of European sources.

Cast-Iron Pipe.—Because of the unusual size of the pipe, a sale by the United States Cast Iron Pipe & Foundry Company to the Metropolitan Water and Sewage Board, Boston, is worthy of note. The quantity was only 170 tons, but the pipe was 84 in. in diameter. It is understood that the price received was $37.50 per net ton, delivered. The transaction also involved 140 tons of fittings of the same size, at $74 per ton. A contract for 680 tons of 6-in. gas pipe at Springfield, Mass., went to R. D. Wood & Co. at $25.40 per net ton, delivered. Public lettings are slow to come out but private buying continues in good volume. Export inquiries persistently appear, but as far as can be ascertained, no sales of importance have recently materialized. Carload lots of 6-in., class B and heavier, are quoted at $23.50 to $24 per net ton, tidewater, class A and gas pipe taking an extra of $1 per ton.

Old Material.—While the strength of the market continues, the volume of actual business is not large. This is partly due to efforts of consumers to discourage advances in price and partly to the disposition of holders to retain stocks in the hope of securing still better returns. Heavy melting steel scrap is held here at about the same prices as those prevailing last week, but wrought scrap and borings and turnings are a little higher. It is seldom that old iron rails are available in this market, but a small quantity is being offered at $18 to $18.50 per gross ton. Brokers are paying about as follows to local dealers and producers, per gross ton, New York:

Old girder and T rails for melting	$12.00 to $12.25
Heavy melting steel scrap	12.00 to 12.25
Relaying rails	19.50 to 20.00
Rerolling rails	12.25 to 12.50
Iron car axles	22.00 to 22.50
Steel car axles	17.00 to 17.50
No. 1 railroad wrought	14.00 to 14.50
Wrought-iron track scrap	12.50 to 13.00
No. 1 yard wrought, long	12.25 to 12.75
No. 1 yard wrought, short	12.00 to 12.25
Light iron (nominal)	4.00 to 4.25
Cast borings	8.00 to 8.25
Wrought turnings	7.75 to 8.00
Wrought pipe	11.50 to 12.00

Cast scrap is firmly held, in sympathy with the greater strength in pig iron, but transactions are not large. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

Old carwheels	$11.50 to $12.00
No. 1 cast (machinery)	12.75 to 13.00
No. 2 cast (heavy)	11.75 to 12.00
Stove plate	9.75 to 10.00
Locomotive grate bars	8.50 to 8.75
Malleable cast (railroad)	9.50 to 10.00

Hecla Iron Works and the Winslow Bros. Company were merged in 1913 under the name of Hecla-Winslow Company, Inc. The purpose of the merger was chiefly to effect economies by joint operation. Announcement is made in a circular just issued that it has been demonstrated that such economies have not been obtained and, therefore, "in a mutual and friendly spirit it has been decided to reinstate the two companies under their original names, ownership and management as of Sept. 1, 1915." The circular is signed by Hecla Iron Works, New York, established 1876, and Winslow Bros. Company, Chicago, established 1885.

For the total of 115,000 tons of rails for which the Russian Imperial Railways Commission has placed orders with the Cambria Steel Company, the Pennsylvania Steel Company, the Illinois Steel Company and the Tennessee Coal, Iron & Railroad Company Robert W. Hunt & Co. have been commissioned to make what is known as their "special inspection" of the rails and accessories.

Metal Market

NEW YORK, Sept. 1, 1915.

The Week's Prices

Cents per Pound for Early Delivery

	Copper, New York			Lead		Spelter	
	Lake	Electrolytic	Tin, New York	New York	St. Louis	New York	St. Louis
Aug. 25	18.00	17.50	34.50	4.60	4.50	13.50	13.25
25	18.00	17.87½	34.70	4.70	4.60	14.50	14.25
26	18.00	17.87½	34.25	4.90	4.75	16.00	15.75
27	18.00	17.87½	.....	4.90	4.75	16.00	15.75
28	18.00	17.87½	33.37½	4.90	4.75	16.50	16.25
30	18.00	17.75	33.50	4.90	4.75	16.25	16.00
31	18.00						

In the latter half of last week copper, lead and spelter advanced sharply and there was heavy and excited buying of all three. Copper is now higher, though an easier tone is developing. Lead is higher, with indications of resale lots and concessions. Spelter has receded a little from the high point. Tin is dull and lower. Antimony is inactive and weak.

New York

Copper.—On Wednesday, Aug. 25, electrolytic was to be had easily at 16c., but there developed suddenly what threatened to be a runaway market and at the close of the day 17c., cash, New York, was paid. On the following day the market was boiling and closed at 18c., 30 days delivered, although some outside lots were sold on that day at 17.50c., cash, New York. Just what caused the sudden flurry is not certain, although it is believed that some of the war order contractors made an effort to buy. One producer stated that American consumers started the buying, which was followed by purchasing on foreign account. The theory has been advanced that the sudden rise in prices may have been engineered to bring England into the market. In any event, prices went up abruptly and on Aug. 25 and 26 a large business was done. The number and volume of sales diminished Friday and Saturday, but a fair quantity was sold, nevertheless. This week the market has been quiet, and the price for electrolytic settled yesterday to 17.75c. to 17.87½c., cash, New York. The cessation of activity is attributed to a realization on the part of consumers that the rapid advance was not altogether natural. Foreign buying is adversely affected by the low rates of foreign exchange; the pound sterling reaching a new low record of $4.55 yesterday. It is still asserted that there are large war requirements to be filled. The Lake quotation had been nominal in the absence of business up to the flurry, and then a new level of 18c. was established. The exports in August totaled 15,168 tons.

Copper Averages.—The average price of Lake copper for the month of August, based on daily quotations in THE IRON AGE, was 19.33c., and of electrolytic, 17.36c.

Tin.—Except for a few sales of small lots of spot and early shipments from the East the market has been continuously quiet; in fact, on Monday and Tuesday of this week it was almost at a standstill. The New York quotation declined until 33.50c. was reached yesterday. The deliveries of August reached the excellent total of 4500 tons, of which 1100 tons came by way of Pacific ports. In stock and landing Aug. 31 was 2527 tons. The arrivals in August totaled 4936 tons, and at the end of the month there was afloat 4730 tons.

Lead.—The lead market in the latter half of last week was as excited as that in copper, and events came fast. Late on Wednesday the leading interest advanced its New York quotation $2 per ton to 4.60c. per lb., and this precipitated a stampede. Sellers went home that night leaving orders for thousands of tons unfilled. On Thursday the New York quotation was advanced to 4.70c., and there was a continuance of liberal buying. The following day, Friday, the market was advanced $4 per ton, or to 4.90c., New York. In the movement many thousands of tons changed hands, including lots of from 500 to 1000 tons, and this despite the fact that some buyers were suspicious of the market because of their experience in the last bulge. This week conditions have been quieter and profit taking by those who bought lead at a low figure promises an easier tone. The New York quotation yesterday was 4.90c. and that at St. Louis, 4.75c., although at New York some talk was heard of 4.85c. as a price acceptable to second hands. The exports in August totaled 1958 tons.

Spelter.—About the middle of last week spelter was active and to a considerable extent shared the excitement in copper and lead. By Friday the market had worked itself up to 16c., New York, prompt delivery, and early this week it was quoted at 16.50c. to 17c., although yesterday it had eased off to 16.25c., New York, and 16c., St. Louis. Future positions range from 15c. to 16c. and 15.50c. is considered a fair average for the last quarter. Spot metal is extremely scarce. In the activity referred to there was good foreign buying as well as on domestic account. This week the market is quieter. The August exports totaled 3589 tons.

Antimony.—In a market that is dull and weak spot antimony has declined to 28c., duty paid. There is plenty of Chinese metal to be had now.

Old Metals.—For a few days the demand was better, but it has again fallen off. Dealers' selling prices are nominally as follows:

	Cents per lb.
Copper, heavy and crucible	17.00 to 17.25
Copper, heavy and wire	16.25 to 16.75
Copper, light and bottoms	14.00 to 14.50
Brass, heavy	12.00 to 12.50
Brass, light	9.75 to 10.25
Heavy machine composition	13.00 to 13.50
No. 1 yellow rod brass turnings	13.75 to 14.25
No. 1 red brass or composition turnings	12.00 to 12.50
Lead, heavy	4.25
Lead, tea	4.00
Zinc scrap	12.00 to 13.00

Chicago

AUG. 29.—Sales of copper, which appear to have exhausted the resources of those sellers representing the weaker aspects of the market, have restored quotations to the basis maintained by leading producers and an advance of 1c. per pound is noted. The recovery in spelter prices is also important. We quote: Casting copper, 17c.; Lake copper, 17.75c.; tin, carloads, 33.50c.; small lots, 36c.; lead, 4.90c.; spelter, nominally, 16.50c.; sheet zinc, nominally, 20c.; Cookson's antimony, 47.50c. to 50c.; other grades, 33c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 13c.; copper bottoms, 12c.; copper clips, 12.50c.; red brass, 10.50c.; yellow brass, 9.50c.; lead pipe, 3.75c.; zinc, 9c.; pewter, No. 1, 17c.; tinfoil, 24c.; block tin pipe, 26c.

St. Louis

AUG. 30.—Both lead and spelter have been marked up sharply. Lead is now quoted at 5c. to 5.10c.; spelter, 17c. to 17½c.; tin, 35c.; Lake copper, 18c.; electrolytic copper, 17½c.; Cookson's antimony, 32c. In the Joplin ore market the advance in spelter has had its effect and prices for zinc blende were firmer, with the basis range for 60 per cent $70 to $83 per ton and the top settlement at $86. Calamine has also been better at $40 to $50, basis of 40 per cent, with the best settlement about $55. Lead ore was weak at $45 per ton for 80 per cent, despite the advance in the metal. Miscellaneous scrap metals are quoted as follows: Light brass, 6.50c.; heavy yellow brass, 8.50c.; heavy red brass, 10c.; heavy copper and copper wire, 12c.; zinc, 6.50c.; pewter, 20c.; tinfoil, 28c.; lead, 3.50c.; tea lead, 3.50c.

The Harmony Club, composed of officers, sales forces and department heads of the J. M. & L. A. Osborn Company, Cleveland, Ohio, held its quarterly meeting Aug. 27 and 28. After enjoying a dinner on the first day the members discussed practical topics, the principal subjects being galvanized sheets, tin plate, copper, eaves trough, conductor and roll roofing. On the following day the most interesting feature was the inspection of tin plate on a test roof, which was made by the club about two years ago, for the purpose of testing the company's brands of tin plate as well as those of other makers. After dinner a meeting was held for general discussion, and many matters of interest were brought out.

The contract for erecting a foundry plant for the Gartland-Toledo Foundry Company, Toledo, Ohio, has been awarded to the M. Rabbitt & Sons Company. The plans provide for two buildings, one to be 43 x 100 ft. and the other 80 x 85 ft.

Iron and Industrial Stocks

NEW YORK, Sept. 1, 1915.

The stock market has been less feverish and more consistently strong, with the passage of what appeared to be an acute crisis in our relations with Germany. Some of the industrial stocks have made further notable gains. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week has been as follows:

Allis-Chal., com..	36¾ - 41½	Pressed Stl., com.	59¼ - 63
Allis-Chal., pref..	68 - 71½	Pressed Stl., pref.	100¼ - 100½
Am. Can, com...	59¼ - 63⅜	Ry. Stl. Spg., com.	38¾ - 40½
Am. Can, pref...	105 - 106	Ry. Stl. Spg., pref.	91
Am. Car & Fdy., com.	68 - 73½	Republic, com...	42½ - 45¼
Am. Loco., com..	54 - 56	Republic, pref...	100½ - 102¼
Am. Loco., pref.	97	Rumely Co., com.	5⅜ - 11⅝
Am. Steel Fdries.	52 - 54½	Rumely Co., pref.	9½ - 14⅛
Bald. Loco., com.	77½ - 83¼	Sloss, com.	53¾ - 56½
Bald. Loco., pref.	105	Pipe, com.	20⅞ - 22¼
Beth. Steel, com.	280 - 293	Pipe, pref.	41 - 46
Beth. Steel, pref..	140 - 149½	U. S. Steel, com..	74⅝ - 77
Case (J. I.), pref.	78 - 80	U. S. Steel, pref..	111½ - 112¾
Colorado Fuel...	40¼ - 44	Va. I. C. & Coke.	57 - 61
General Electric.	173 - 178½	West'gh'se Elec..	115 - 118⅜
Gt. No. Ore Cert.	41¾ - 43½	Am. Ship, com.	41
Int. Harv. of N. J., com.	105⅞ - 110	Chic. Pneu. Tool.	77 - 81½
Int. Harv. Corp., com.	70	Cambria Steel...	54¼ - 55½
Lackawanna Stl..	64½ - 72	Lake Sup. Corp..	9 - 10⅝
Nat. En. & Stm., com	27 - 29¾	Pa. Steel, pref.	82
Nat. En. & Stm., pref.	89 - 90	Warwick	10
		Cruc. Steel, com.	74 - 77½
		Cruc. Steel, pref.	101 - 102
		La Belle Iron, Com.	36 - 46⅜

Dividends

The Railway Steel Spring Company, regular quarterly, 1¾ per cent on the preferred stock, payable Sept. 20.

The Pettibone-Mulliken Company, regular quarterly, 1¾ per cent on first and second preferred stock, payable Oct. 1.

OBITUARY

EDWARD M. GROVE, treasurer of the McConway & Torley Company, Pittsburgh, died at his home in that city, Aug. 26, aged 58 years. He was born in Chambersburg, Pa., and went to Philadelphia when 14 and worked for a time in a printing office. In 1876 he became a telegraph operator at Merion, Pa., near Philadelphia. After about three years' service he became district superintendent of the Pullman Company at Cincinnati, Ohio, and was from there transferred to Jersey City, N. J., in a similar capacity. In 1886 he accepted a position as assistant general manager of the Wagner Palace Car Company in New York. He left this position in 1889 to go to Pittsburgh with the McConway & Torley Company, and for the last 15 years has been treasurer. He was president of the Railway Supply Manufacturers' Association in 1910-11 and was a member of the Manufacturers' Club and the Railway Club of Philadelphia and the Duquesne Club of Pittsburgh. He leaves his widow and a daughter.

CHRISTOPHER BELL BOUTON, who with his brother, the late Nathaniel S. Bouton, was prominently identified with the foundry industry in the West, died at his home in Chicago, Aug. 26, aged 76 years. He was born at Concord, N. H., had been in the iron business since 1856, and had been president of the Union Foundry Works, though retired for several years. The brothers had been associated in particular in the manufacture of carwheels and railroad castings and are recalled especially because of their helpful influence in the starting on their career of a number of now prominent men.

THOMAS ATKINSON, for many years prior to 1909 connected with the advertising department of THE IRON AGE as a traveling representative, died Aug. 29 at Milford, Mass. Mr. Atkinson's earlier business career was in the hardware trade and for 20 years preceding 1881, when he went with the David Williams Company, he traveled for an importing and jobbing house dealing in cutlery and fancy hardware. The successor of this house is the Dame-Stoddard Company, Boston, Mass.

DEXTER BRACKETT, chief engineer of the Metropolitan Waterworks and a widely-known hydraulic engineer, died in Boston Aug. 27. He was a member of the American Waterworks Association and the American Society of Civil Engineers, of which he had been a director. He had also served as president of the Boston Society of Civil Engineers and of the New England Waterworks Association and had written numerous papers on waterworks subjects.

J. W. HARRY JAMES, of recent years connected with the American Bridge Company, died Aug. 29 at his home in Chester, Pa. He was a native of England and came to this country 20 years ago. Prior to coming here he managed important engineering enterprises in England, France, Russia and India, having been consulting engineer of the Department of Public Works of the Empire of India. He leaves his widow.

RICHARD H. BURDSALL, treasurer of the Russell, Burdsall & Ward Nut & Bolt Company, Port Chester, N. Y., died Aug. 30 at his country home in North Egremont, Mass., from heart disease. He was also president of the First National Bank, Port Chester, and an officer of the Yonkers Trust Company and the Westchester Fire Insurance Company. He leaves his widow and two sons.

WILLIAM GRAVER, president and founder of the William Graver Tank Works, East Chicago, Ind., died at his home in Chicago, Aug. 25, following an extended period of ill health, aged 73 years. He was born in Chambersburg, Pa., and removed to Chicago in 1884. He leaves five sons, all of whom are active in the business of the Graver Tank Works.

JOHN A. MCNAB, for more than half a century head of the McNab & Harlin Mfg. Company, 55 John Street, New York, died at his summer home in West Oakland, N. J., Aug. 28, aged 71 years. He was a poet, writer, ornithologist and horticulturist. He retired from business several years ago.

W. M. CLARK, foundryman, Bayonne, N. J., died Aug. 30 at his summer home at Winsted, Conn., aged 70 years.

The Steel Meeting at Cleveland

For the Cleveland meeting of the American Iron and Steel Institute, Oct. 22 and 23, the following committee on local arrangements has been selected: Samuel Mather, chairman, William G. Mather, Frank Billings, George Barton, William P. Palmer, Harry Coulby, Price McKinney, John A. Penton, B. F. Bourne, H. A. Fuller, James H. Hoyt and D. Z. Norton.

On Thursday, Aug. 26, the J. M. & L. A. Osborn Company, Cleveland, Ohio, gave a picnic for all its employees and their families. They were taken to the grounds of the Cleveland Yacht Club. The afternoon's entertainment comprised a ball game between the office force and manufacturing department, and contests for men, women and children. Suitable prizes were awarded to the winners. Dinner was served by the Yacht Club in its dining hall, after which dancing was enjoyed in the dance hall.

The Hydraulic Press Mfg. Company, Mount Gilead, Ohio, has elected the following officers: A. Q. Tucker, president; W. G. Beebe, vice-president; Frank B. McMillin, general manager and secretary; M. W. Spear, treasurer. Dr. N. Tucker has been added to the directorate.

A 10 per cent advance in wages has been decided on by the Empire Steel & Iron Company, effective Oct. 1, and applicable to all day workmen at its furnaces at Catasauqua, Pa., and Oxford, N. J., and its iron mines at Mt. Hope and Oxford.

The Central Steel Company, Massillon, Ohio, will soon be in the market for cranes, ladles and ingot buggies to take care of its enlarged open-hearth steel output. It will also probably extend its billet shed a few more bays.

Pittsburgh and Nearby Districts

The Mesta Machine Company, Pittsburgh, recently delivered a 1500-ton quick acting steam hydraulic forging press to the Pressed Steel Car Company in the same city. This press is of the Mesta standard four-column type and is to be used for heavy forging work. Among its important features are the valves which permit the use of a single controlling lever, and cause the press to stop automatically at any point the operator desires. With this valve the press cannot jump, which makes it of extreme value in punching, shearing, etc. The intensifier is located directly above the hydraulic cylinder, thus eliminating the necessity of high pressure piping and insuring a compact working unit.

The Federal Radiator Company, New Castle, Pa., which took over the plant of the Penn Motor Company, is rebuilding the works and making several large additions. It proposes to make a full line of steam and hot-water radiators and will have its products in the market within 60 to 90 days.

Rapid progress is being made in the erection of the new plant of the Knox Pressed & Welded Steel Company at Wheatland, Pa. All the machinery will be motor driven, power being secured from Youngstown, Ohio. It is expected the new plant will be ready for operation about Nov. 1.

The Shenango Furnace Company, Sharpsville, Pa., is now operating its Nos. 1, 3 and 4 blast furnaces. No. 1 is running on Bessemer, making about 600 tons per day, while Nos. 3 and 4 are on basic, making together about 600 tons per day.

The Youngstown Foundry & Machine Company, Youngstown, Ohio, has received an order for a new merchant mill for the Union Rolling Mill Company, Cleveland, Ohio, and for a large roll lathe for the Timken Roller Bearing Company, Canton, Ohio.

The Driggs-Seabury Ordnance Company, Sharon, Pa., has elected the following officers: A. E. Borie, president; W. L. Wright, formerly vice-president of the Keystone Watch Company, vice-president and general manager. The directors, in addition to the above, are George W. Burleigh, E. C. Delafield, James Imbrie and John C. Jay, Jr., of New York, and John Stevenson, Jr., and John C. Stevenson of Sharon. John Stevenson, Jr., will be chairman of the board.

The Pittsburgh Steel Company, Pittsburgh, has issued a statement showing sales for the twelve months ended June 30, 1915, to have been $11,649,863.97, an increase over the twelve months ended June 30, 1914, of $625,170.39. Net profits for the year ended June, 1915, are given as $858,160.02, an increase over the previous twelve months of $441,609.11.

The Carnegie Steel Company, Pittsburgh, is in the market for some auxiliary equipment, including cranes, for its new rail mill at Bessemer, Pa.

The East Ohio Gas Company has made a contract with the council of Youngstown, Ohio, to supply that city with natural gas for domestic use for the next ten years. The rate for the first three years will be 30c. per 1000 ft., and for the last seven years 35c. per 1000 ft.

The John F. Casey Company, Pittsburgh, has received a contract for the foundations for the new blast furnace to be built by the United Steel Company, Canton, Ohio.

The S. R. Smythe Company, engineer and contractor, House Building, Pittsburgh, has received an order from the Central Steel Company, Massillon, Ohio, for the building of four more 50-ton open-hearth furnaces. The Smythe Company built the present three 50-ton furnaces in the plant, which was originally laid out for seven furnaces. There is enough soaking pit and crane capacity to take care of the output of the four new furnaces. They are expected to be finished about March 1, next year.

The Westinghouse Electric & Mfg. Company has discontinued the operations of its foundries on the North Side, Pittsburgh, and will remove the greater part of their equipment to its foundries in Cleveland, Ohio.

The Stirling-Warfel Mill Supply Company, Erie, Pa., recently incorporated by John and Marian Stirling and Rudolph S. Warfel to manufacture mill, marine and factory equipment, has let contract for a two-story factory and warehouse building. The Erie Steel Construction Company will furnish the steel.

Plans are being prepared for rebuilding the plant of the French Creek Foundry Company, Franklin, Pa., recently destroyed by fire.

The Federal Zinc & Lead Company, Huntington, W. Va., has been incorporated with a capital stock of $200,000, by Frank Enslow, Jr., Frank Ellington and G. D. Miller.

The American Automatic Save-a-Life Fender Company, Cameron, W. Va., is said to be planning the construction of a plant.

The city of Keyser, W. Va., is planning to issue $35,000 of bonds, most of which will be used for the improvement of the water system. W. C. Pifer is mayor.

The Modern Flint Glass Company, Parkersburg, W. Va., is planning the establishment of a factory at a cost of $50,000. John McFadden and James O. Gill are interested.

The D. H. Gowing Veneer Company, Burnsville, W. Va., will erect a mill for the manufacture of veneers. Power and special equipment, including veneer saws and slicers, will be purchased.

The Erie Trailer Mfg. Company, Twelfth and Liberty Streets, Erie, Pa., has been incorporated with a capital of $100,000, to manufacture trailers for automobiles and trucks. H. A. Wilburn, C. C. Leon and Frank J. Behrens are among the incorporators.

The Osceola Car Company, Osceola Mills, Pa., has been incorporated with a capital of $5,000 by Charles H. Rowland, Philipsburg, and C. A. Rickenbaugh and John Sheriff, Osceola Mills, to manufacture railroad and mine cars.

The Berlin Smokeless Coal & Clay Mining Company, Berlin, Somerset County, Pa., has been incorporated with a capital of $25,000 by A. J. Hillegas, Berlin; W. H. Miller, D. J. Hillegas and J. A. Hillegas, Fairhope, Pa., and L. C. Colborn, Somerset, Pa., to manufacture coke and by-products and to mine coal and fireclay.

The Riter-Conley Mfg. Company, Pittsburgh, has taken a contract for the Aluminum Ore Company, East St. Louis, Ill., for precipitator tanks and rotary kilns in which about 2200 tons of plates will be used; also pier 29 for the Pennsylvania Railroad on the North River, New York, taking 250 tons of fabricated steel; building for the Balbach Smelting & Refining Company, Newark, N. J., taking 175 tons, and building for the Erie Silk Mills, Malinson & Co., Erie, Pa., taking 100 tons.

The Valley Mold & Iron Company, Sharpsville, Pa., has placed a contract with the Penn Bridge Company, Beaver Falls, Pa., for two steel buildings, one 75 x 350 ft., to be used as a casting building, and another 75 x 150 ft., to be used as a ladle cleaning and repair building; another contract with the McMyler Interstate Company, Cleveland, Ohio, for a third steel building, and another contract with the Morgan Engineering Company, Alliance, Ohio, for six electric traveling cranes. The buildings will require 700 to 800 tons of steel. The company turned out in August over 16,000 tons of ingot molds, the largest output in any one month in its history. It expects to start its Alice blast furnace at Sharpsville in September on basic iron, and if this is done the output of basic will be exchanged with a Sharpsville furnace interest for Bessemer iron.

Reports are again being printed that the National Tube Company, Pittsburgh, will spend $5,000,000 in building blast furnaces, open-hearth steel works and tube mills adjacent to its Riverside works at Wheeling, W. Va. Official advices are that there is no truth in these reports. The company has no plans whatever for new plants or additions to existing works in the Wheeling district.

The annual meeting of stockholders of the Petroleum Iron Works Company, Pennsylvania Tank Car Com-

pany and Pressed Steel Products Company, identified interests, was held in the main offices of these concerns at Petroleum, near Sharon, Pa., last week. Officers and directors were all re-elected. All three companies are operating their plants to the utmost capacity, and have orders ahead for some months.

PERSONAL

A. T. DeForest, vice-president United States Steel Products Company, San Francisco, is to be decorated with a gold medal of honor by the Superior Jury of the Panama-Pacific International Exposition "for the thought and energy contributed to the conception, financing and execution of the United States Steel Corporation exhibit." To other collaborators of the exhibit, gold medals will be bestowed as follows: L. J. Affelder, American Bridge Company; B. B. Ayers, American Steel & Wire Company; W. H. Clingerman, H. C. Frick Coke Company; C. L. Close, Bureau of Safety, Sanitation and Welfare; W. W. J. Croze, Oliver Iron Mining Company; L. F. Hamilton, National Tube Company; H. V. Jamison, American Sheet & Tin Plate Company and director of the exhibits; E. J. Schneider, bridge and structural department, United States Steel Products Company; R. B. Woodworth, Carnegie Steel Company, Pittsburgh, and V. S. Yarnall. Silver medals were awarded to E. C. Collins, Pittsburgh Steamship Company; R. R. Richardson, Pittsburgh & Conneaut Dock Company, and D. E. Sawyer, Illinois Steel Company. Altogether the United States Steel Corporation received 46 awards, as follows: 11 grand prizes, 1 special gold medal, 10 medals of honor, 20 gold medals, 3 silver medals and the gold medal of honor awarded Mr. DeForest.

Van H. Manning of Holly Springs, Miss., has been appointed by President Wilson to succeed the late Dr. J. A. Holmes as director of the Bureau of Mines. Mr. Manning has been long in the Government service, for many years in the Geological Survey, and has devoted himself to scientific work. He was appointed to the Bureau of Mines when it was created in 1910, and was made assistant director in the following year. Since June 1, when Dr. Holmes was forced by failing health to suspend work, Mr. Manning has been in charge of the bureau.

E. D. Graff, for several years in the sales department of the Pittsburgh office of Joseph T. Ryerson & Sons, has been transferred to Chicago in the sales department.

C. B. Price, recently identified with the Pittsburgh office of the General Electric Company, has resigned to become the Pittsburgh agent of the Western Conduit Company, a subsidiary of the Youngstown Sheet & Tube Company.

Robert A. McKean, formerly superintendent of the Keystone works of the Jones & Laughlin Steel Company, Pittsburgh, has been appointed structural engineer to succeed William C. Coffin.

A. F. Huston, president Lukens Iron & Steel Company, Coatesville, Pa., returned Aug. 28 from a seven-week trip to the Pacific coast.

H. B. Spackman, second vice-president and purchasing agent Lukens Iron & Steel Company, Coatesville, Pa., underwent a minor but somewhat serious operation in the Coatesville Hospital last Monday and was later taken to his home where he will be confined for several weeks.

Arthur O. Baer, first assistant superintendent of blast furnaces at South works, Illinois Steel Company, has been appointed superintendent of blast furnaces for the Minnesota Steel Company at Duluth. A farewell dinner was tendered him by his associates at the Stratford Hotel, Chicago, Aug. 23.

H. L. Usher, for nine years connected with the Pacific Hardware & Steel Company, and for the past four years manager of its New York office, has resigned and accepted a position in the sales department of the Oliver Iron & Steel Company, Pittsburgh. He will cover the Eastern territory, and will spend the greater part of his time in New York City and immediate vicinity.

Leo. T. Neidow and Frank G. Payson have opened offices in the Madison Terminal Building, 9 South Clinton Street, Chicago, and under the name of Neidow & Payson will conduct a general machinery agency. Mr. Neidow for the past eighteen years was with the Niles-Bement-Pond Company, in its Chicago office. Mr. Payson was formerly with the Niles-Bement-Pond Company and for the past four years was Western representative for the Union Petroleum Company, Philadelphia.

R. S. Bryant, for many years consulting engineer of the Standard Welding Company, Cleveland, Ohio, has been appointed factory manager in charge of all manufacturing.

Garrard Harris, special agent of the Bureau of Foreign and Domestic Commerce, spent several days last week in Cincinnati, Ohio, conferring with manufacturers relative to business in Central America.

M. E. Gregg has been appointed district sales manager of the Republic Iron & Steel Company for the Buffalo district, which includes Canada, with headquarters in the White Building, Buffalo. The appointment was effective Aug. 1. The Buffalo office, of which Mr. Gregg has been in charge for some years, was formerly under the jurisdiction of the Cleveland district office.

L. P. Moon, a power and illumination expert of New York, has become connected with the Truax Electric Company, Wilmington, Del.

William C. Coffin, Vice-President of Knox Pressed & Welded Steel Company

William C. Coffin has severed his connection with the Jones & Laughlin Steel Company to become vice-president of the Knox Pressed & Welded Steel Company, Pittsburgh. Mr. Coffin was vice-president of the Riter-Conley Mfg. Company from 1898 to 1908, and since then has been structural engineer of the Jones & Laughlin Steel Company. His new office will include also the duties of general sales manager and he will devote his entire time to his new connection. The other officers of the Knox Pressed & Welded Steel Company are Luther L. Knox, president, and Irvin F. Lehman, secretary and treasurer. The approaching completion of the new Knox plant at Wheatland, Pa., was the deciding factor that brought Mr. Coffin to the company. This plant will make riveted and welded steel plate work, while the company's present plant at Farrell, Pa., will be continued in the manufacture of the Knox patented water cooled devices for open-hearth and heating furnaces. The Knox Pressed & Welded Steel Company has equipped 38 open-hearth steel plants with its water cooled devices and is now equipping 30 other such plants in the same way. It has been operating its plant at Farrell to full capacity for many months.

Benzol Recovery at Lebanon, Pa.

The Lackawanna Iron & Steel Company is installing a plant for the recovery of benzol at its by-product coke ovens at Lebanon, Pa., with an output of about 1600 gal. a day. The plant will be ready for operation between Oct. 15 and Nov. 1.

The Colburn Machine Tool Company, Franklin, Pa., has made a voluntary advance of 10 per cent in the wages of its workmen, effective Sept. 1. The company, contrary to reports in circulation, is not manufacturing munitions of war but is busily engaged in building its standard line of metal-working machinery. It now employs about 250 hands, in addition to which at least 200 men in other plants in Franklin and adjacent towns are making castings, parts and accessories used in its machines.

The Franklin plant of the American Steel Foundries at Franklin, Pa., which has been idle for a long time, was again put in operation on Wednesday, Sept. 1.

Machinery Markets and News of the Works

EASTERN RAILROAD BUYS

Less Publicity for War Orders Is Rule

Automobile Plants Extending on a Large Scale —Demand for Turret Lathes in West Has Renewed Strength

Big deals involving machine tools for the manufacture of munitions are still recurrent, but there is a growing disinclination on the part of those concerned to give publicity to the details. This is true in other directions also. It is interesting to note, as stated in the New York market, that one house has done in one month a business that compares favorably with that of entire years. Automobile makers and those whose products are allied have been extremely heavy purchasers, as evidenced by the buying in recent weeks of the Morrow Mfg. Company, the Pierce-Arrow Automobile Company and the New Departure Mfg. Company.

The long looked-for purchasing by the Seaboard Air Line came to an issue last week when the company systematically began to place orders against the largest railroad list of many months. Delivery is to be made at Portsmouth, Va.

Of interest in the New York territory is the item that the Curtiss Aeroplane Company, Buffalo, has filed plans for the fourth addition to its plant within one year; while another important feature from Buffalo is the incorporation with a capital stock of $100,000 of the Transmission Ball Bearing Company, which is to be the United States branch of the Chapman Double Ball Bearing Company, Toronto. Also of interest is the announcement that the Seneca Falls Mfg. Company, maker of machine tools, will add several buildings to its plant.

The Scovill Mfg. Company, Waterbury, Conn., has added 38½ acres to its land holdings, it is understood for reservoir purposes. Extensive additions to the company's plant are being rushed to completion.

The Autocar Company, Ardmore, Pa., has prepared plans for another large addition to its plant which will be rushed to completion. At Eddystone, Pa., the large plants associated with the Baldwin Locomotive interests are nearing readiness for operation. Shipments to foreign ports will be made direct without transshipment. At Baltimore a new industrial center is springing up at Curtis Bay.

In Cleveland the foreign demand for turret lathes is again strongly in evidence, while automatics also are much sought for. The high prices offered for second-hand machines are bringing many used machines on the market. Among the heavy buyers of equipment in the Middle West is the Cleveland-Canton Axle Company, Canton. Like others who have engaged in the work, makers of munitions in and near Cincinnati have encountered unlooked-for delays and difficulties.

Chicago reports that manufacturers of ammunition are having machine tools made by other than regular tool builders, and that inquiry for tools other than as occasioned by war operations is exceptional. A representative of the Russian Government has been in Chicago and Cincinnati in the past few days. In the latter city he placed a number of orders, including a large one for laundry machinery to be installed in Russian hospitals.

August was a big month in Milwaukee, as it was elsewhere, while a good feature reported from that city is that its foundries are active. Trade in St. Louis has been hampered by the inability to make deliveries, while on the Pacific Coast a lack of stock also has made business light. Canada is rejoicing over the fact that its importance in manufacturing is becoming more apparent to the other colonies under the British Government. Canadian firms have been invited to tender bids on large quantities of equipment required by the Northwestern Railway of India.

New York

NEW YORK, Aug. 31, 1915.

The stream of war orders for machine tools is not subsiding, although the filled-up state of many of the builders is causing its course to change to some extent. Deals of vast proportions have been put through, but for the present details cannot be reported. Lathes continue to lead the demand.

Some idea of the volume of orders received in recent months is afforded by the fact that the business which one New York machinery house did in the month of July compares favorably with that done in some of its best years. Extremely heavy purchasers in recent weeks have been the Morrow Mfg. Company, Elmira, N. Y., the New Departure Mfg. Company, New Britain, Conn., and the Pierce-Arrow Automobile Company, Buffalo, N. Y. The last-named company bought $200,000 of equipment and was satisfied with delivery in four months.

The Seaboard Air Line last week began the distribution of orders for tools to be delivered at Portsmouth, Va., as was expected. Purchasing on a large scale by this railroad has been anticipating for years, and this time the trade was not disappointed, as the list ran into many thousands of dollars.

A representative of La Hispano-Suiza, an automobile company of Barcelona, Spain, is in this country, taking quotations on about $250,000 worth of tools for making automobiles. He has left New York to visit some of the machine tool factories in the Middle West.

Australian representatives have placed orders here for several small batteries of shell-making machinery. In one case the machines are to be delivered to a printing house in Australia which will attempt to make shells instead of turning out printed matter.

The C & C Electric & Mfg. Company, Garwood, N. J., has been actively looking for shell-making machinery, and is interested in procuring single-purpose lathes, whether made by tool builders or others.

C. W. Leavitt & Co., 30 Church Street, New York, desire catalogs, full information and export prices, f.o.b. steamer, New York, on lathes, milling machines and other tools.

The United States Light & Heating Company, Niagara Falls, N. Y., has obtained a contract for making high-explosive shells and has made inquiry for machines.

The Eddystone Munitions Company, Eddystone, Pa., is expected to place orders in a week or ten days.

The Neptune Meter Company, Long Island City, has purchased machines for a contemplated shrapnel fuse contract.

The Chevrolet Motor Company of New York is planning to increase the facilities of its Tarrytown plant in order

to substantially enlarge its output. It is understood that the company will eventually manufacture the motors for its cars at Tarrytown, as well as at Flint, Mich. It has orders and deposits on several thousands of cars.

The Remington Arms & Ammunition Company, Bridgeport, Conn., placed an order last week for twenty-five Gould & Eberhardt shapers.

The Dominion Iron & Steel Company, Ltd., Sidney, has had a representative in New York looking for a large number of engine lathes, capable of turning 6, 9 and 12-in. shells.

The American Can Company, which has taken a large shell contract, and is expected to purchase a large quantity of machinery for the plant it will erect at Kennilworth, N. J., has placed an order for thirty Norton grinders.

The Hyatt Roller Bearing Company, Newark, N. J., has awarded to the American Concrete Steel Company a contract for a six-story building, 90 x 110 ft. The building is to be used for heat treating, and special consideration has been given to its ventilation.

The Syracuse Malleable Iron Works, Syracuse, N. Y., has awarded a contract for the erection of three buildings of steel, concrete and brick, which will increase the capacity of its plant about 50 per cent. It is expected that the new buildings will be ready for occupancy by Jan. 1.

The C. A. Durr Packing Company, Utica, N. Y., has let the general contract for an addition to its packing plant.

The city of Yonkers, N. Y., has plans in preparation for the construction of a new waterworks system and for improvement of the present system. The estimated cost approximates $3,000,000.

The Syracuse Milling Company has let the general contract for a two-story storehouse, 55 x 58 ft., to be added to its plant at Canal Street and Teall Avenue, Syracuse, N. Y.

The village trustees, Attica, N. Y., are having plans completed for the construction of a waterworks system, the estimated cost of which is $125,000.

The La France Fire Engine Company, Elmira, N. Y., has let contract for a two-story and basement addition to its plant, 130 x 150 ft.

The Seneca Falls Mfg. Company, manufacturer of machine tools, Seneca Falls, N. Y., is taking bids for the following new factory buildings: Main building, 60 x 460 ft., two stories; foundry, 80 x 140 ft., one story, and miscellaneous mill buildings. The plans are by Willard Case & Co., engineers, 17 Battery Place, New York City.

The Curtis Aeroplane Company, Buffalo, has this week filed plans for the fourth addition within a year to its plant at Churchill Street and the New York Central Railroad. It is for an extension of the shop building and boiler house to cost $50,000.

The Transmission Ball Bearing Company, Buffalo, has been incorporated with a capital stock of $100,000 to manufacture ball bearings for factory transmission and for engines, motors and trucks. The directors of the new company (which is the United States branch of the Chapman Double Ball Bearing Company of Toronto) are W. J. Murray and J. P. Beatty of Toronto and W. Morse Wilson of Buffalo. The office of the company is at 1407 West Avenue, Buffalo.

The Atlas works of the Standard Oil Company has filed a building permit for the erection of a one story pump house, to cost $10,000, at its plant, Elk Street and Buffalo Creek Terminal Railroad, Buffalo.

The Globe Malleable Iron Works, Syracuse, N. Y., will, in addition to the foundry extension reported last week, build and equip a boiler house, 34 x 52 ft., one story. The contract for the building has been let.

Preliminary surveys and plans are being made by the Ward Carpenter Company, engineers, Franklin Avenue, Tarrytown, N. Y., for waterworks at Elmsford, N. Y. John E. Murray is village clerk.

The board of trustees of the village of Manchester, N. Y., R. P. Craig, president, will receive sealed proposals until Sept. 15 for the construction of waterworks pump-house, well and standpipe; also four miles of cast-iron mains, hydrants, valves and valve boxes and pumping equipment.

The beef house to be erected by the Jacob Dold Packing Company, William Street and New York Central Railroad, Buffalo, N. Y., is to be 100 x 160 ft., five stories and basement and will cost $70,000.

The Attica Water, Gas & Electric Company, R. W. Harris, manager, Attica, N. Y., is in the market for one 75-kw. two-phase, 60-cycle, 1100-volt generator with exciter and ammeters, voltmeters and switches.

Plans have been completed for a sewage disposal plant to be constructed at the New York State Farm School of Agriculture at Farmingdale, N. Y., at an estimated cost of $35,000.

New England

BOSTON, MASS., Aug. 30, 1915.

The Bristol Brass Company, Bristol, Conn., will erect opposite its present plant on Broad Street a new factory, 125 x 300 ft. When the new building is equipped the working force will be doubled.

The Thomson Drop Forge Company, Plantsville, Conn., will repair and occupy the plant owned by the borough of Plantsville as soon as the papers transferring the ownership are filed. This will enable the company to increase the number of its employees. The name of the concern which is to occupy the present quarters of the Thomson Company has not been made public.

The Waterville Cutlery Company, Waterville, Conn., has secured a contract to furnish 500,000,000 shells for army rifle cartridges and 100,000,000 cartridge clips. President Roswell A. Clark states that considerable new machinery will be installed and the number of employees increased.

Work has been started on the Bristol Company's new factory at Platt's Mills, Conn. The building will be 50 x 150 ft., six stories.

Edward W. Shedd, civil engineer, Providence, R. I., is engaged in making a preliminary survey for a waterworks for the towns of Somerset, Swansea and Dighton, Mass. It is understood that he has been engaged by a group of Rhode Island capitalists who will finance the proposed undertaking.

It is reported that the Remington Arms-Union Metallic Cartridge Company is negotiating for a 40-acre tract of land in the northeastern section of Bridgeport, Conn., which is to be developed for homes for its employees.

Although the new casting shop at Torrington, Conn., of the Coe Brass Company branch of the American Brass Company is still under construction, work was begun in a portion of the building Aug. 24.

The Blakeslee Forging Company, Southington, Conn., has filed certificates of an increase of 4000 shares to its outstanding stock. It was reported last week that this company was planning to add to its equipment.

Pratt & Inman, dealers in steel and iron, 12 Cherry Street, Worcester, Mass., are building a two-story addition to their warehouse. The new building will be 50 x 99 ft., of brick and steel.

M. F. Cahill, manufacturer of ferrules, will build a factory at L Street and East First Street, South Boston, Mass. It will be of brick, mill construction, 110 x 137 ft., three stories.

The Lamb Knitting Company, Chicopee Falls, Mass., will erect a new brick, cement and steel pattern building on Bridge Street. The estimated cost is $10,000.

The Automatic Fire Escape Company is a new industry in Tilton, N. H. It is installing machinery in a part of the plant formerly occupied by the Tilton Mills Company. F. A. Boyer is president.

It is reported that the Chadwick Lead Mills property at Forest River, Salem, Mass., is to be sold to a syndicate for the manufacture of war munitions. Attorneys have been looking up the title to the property and workmen are repairing the buildings.

The Deerfield River Power Company has bought the property of the Metal Edge Box Company at Readsboro, Mass., where it intends to develop 4000 hp. The electrical machinery will be installed this fall. The box company has taken a lease of the mills for five years.

The Vitrified Wheel Company, Westfield, Mass., manufacturers of grinding wheels, has awarded a contract and work has been commenced on a two-story addition, 40 x 100 ft., to its main factory.

It is announced that the Hartford Automobile Parts Company, Hartford, Conn., will move to New Britain, Conn., through the efforts of the New Britain Chamber of Commerce. A building company has been formed to erect a factory on East Ellis Street, New Britain. The building will be 60 x 200 ft., two stories, and so constructed that two additional stories can be added.

The Union Mfg. Company, New Britain, Conn., started Aug. 30 on a working schedule of thirteen hours a day. The company is building an addition to its plant which will give it more floor space to meet the demand for increased output.

The Wood Boiler Company, New Bedford, Mass., is a new corporation with an authorized capital of $22,500. Charles Wood is president and treasurer.

The Scovill Mfg. Company, Waterbury, Conn., has added 38½ acres of land to its holdings in the eastern part of the city. It is understood that the land is to be used for a reser-

voir for the use of the plant on the Mad River. The extensive additions to the Scovill plant are being rushed to completion with all possible speed. The Scovill Company on Aug. 25 made a voluntary grant to its employees of a Saturday half holiday and a 10 per cent increase in pay, both to day and piece workers.

Philadelphia

PHILADELPHIA, PA., Aug. 30, 1915.

Large shipments of war munitions and other products and materials are being made from this port and the indications point to still larger and more frequent shipments. Two vessels took on cargoes last week which are to be transported to Vladivostok. One of the vessels took on explosives, and the other a cargo of rails and locomotives, also for delivery to the Russian Government at Vladivostok. The locomotives which were shipped represent a part of the large order received by the Baldwin Locomotive Works. Early in September a Japanese steamship is expected to arrive here to take on railroad equipment for Russia. Large quantities of shells, guns and other munitions will be shipped from here.

The Bethlehem Steel Company has leased a section of land on which it will extend its Redington fuse plant. It is planned to erect three large buildings without loss of time.

The Consolidated Engineering Company, Baltimore, Md., has taken a contract for the erection of a two-story factory building, 100 x 190 ft., for the Pangborn Corporation, Hagerstown, Md. The structure will be of concrete, steel and brick and will cost $60,000. Peuckert and Wunder, Philadelphia, are the architects.

The Caledonian Dye Works, Philadelphia, Pa., has bought a plot of land at Westmoreland and Emerald Streets, as a site for a new factory, but construction will not be started until business conditions make enlargement of the company's facilities advisable.

The Santo Mfg. Company, Philadelphia, formerly the Keller Mfg. Company, manufacturer of vacuum cleaners, has obtained a shrapnel contract.

The De Laval Steam Turbine Company, Trenton, N. J., has been in the market for one or two machines for use in its factory in Sweden.

Plans for an addition to the factory of the Autocar Company, Ardmore, Pa., have been completed and its erection will be rushed through in record time to meet the rapidly increasing demand for the company's cars. The new building will be five stories and basement and will adjoin the recently enlarged three-story and basement building. Its frontage will be 100 ft. on the Lancaster Pike. This factory is not only designed to meet every requirement of the State laws, but many other features for the safety and comfort of the employees have been added. There will be a separate wing, 30 x 40 ft., finished in white marble with tiled floors, to contain shower-baths, lavatories and rest rooms for the workmen. A fire and smoke-proof tower will be another feature. The lighting specifications call for modern steel fireproof sash and the plan is so laid out that 79 per cent of the area is lighting space as against 21 per cent brick. The construction is a combination of fireproof and "slow burning." The columns and girders are fireproof steel. The first floor will be used as general offices for the production departments, the top floor for engineering, drafting and experimental work and the intermediate floors for machine shops.

The North Penn Motor Company, North Wales, Montgomery County, Pa., has been incorporated with a capital of $5,000 by Ralph W. Shearer, North Wales; Charles E. Wade, East Orange, N. J., and others.

The Atlantic Steel Castings Company, Philadelphia, has been incorporated with a capital stock of $5,000 by Clarence Toland, Wayne, Pa.; James D. Drinker, 2045 Chestnut Street, Philadelphia; Thomas E. Rodman, Llanerock, Pa., to manufacture castings, steel patterns, tools and machinery.

The Keystone Device Company, Harrisburg, Pa., has been incorporated with a capital of $5,000 by John M. Delaney and Beverley W. Glover of Harrisburg, and Isaac W. Motter, West Fairview, to manufacture patented articles.

LaRoche Brothers, Inc., 506 North Broad Street, Philadelphia, has been granted a State charter to repair motor vehicles. The incorporators are Gus C. Muller, 2014 Girard Avenue; J. LaRoche, 7 Church Lane, and Arthur W. LaRoche, Gorgas Lane and Anderson Street. The capital stock is $10,000.

The Allen Street Sweeper & Auto Company, Allentown, Pa., has been incorporated with a capital of $10,000 by Arthur G. Dewalt, 309 North Sixth Street; Howard S. F. Barner, James F. Garman, Henry Krouse and Henry Hantz to manufacture automobile trucks and auto street cleaning apparatus.

The American Washing Machine Company, Lanesboro, Pa., has been incorporated with a capital of $20,000 by Clarence E. Wright, C. W. Glidden and W. A. Skinner, Susquehanna, Pa.; John S. Barnes and Ward Decker of Lanesboro, to manufacture washing machines and hardware.

The Southern Bagging Company, Margolius Bros., owners, Norfolk, Va., has awarded a contract for a factory building to cost $12,000 to the Nash-Jones Company, Norfolk, Va. The plant will manufacture jute bagging and other jute products. An order for textile machinery amounting to $25,000 has been placed with the Smith & Furbush Machine Company, Philadelphia. A preliminary electric service in 125 hp. motors will be installed. The contract for an automatic sprinkler system to cost $7,500 has been placed with the General Fire Extinguisher Company, Charlotte, N. C.

The Susquehanna Cut Glass Company, Columbia, Pa., will erect a brick building, 25 x 75 ft., for manufacturing purposes.

The Chester Engineering & Ordnance Company, Chester, Pa., lately incorporated, has taken over the Patterson Mills and will install machinery for the manufacture of shrapnel.

Baltimore

BALTIMORE, MD., Aug. 30, 1915.

Curtis Bay, near Baltimore, is fast becoming a large industrial center because there is plenty of room to expand and because of the shipping facilities. Several large plants are located there and several others are being constructed. It is believed that still others will shortly locate in that section. Several of the plants now in operation there are handling war orders on a large scale.

P. Kennedy's Foundry, Light and Wells streets, Baltimore, has awarded to Edward Brady & Sons, 1113 Cathedral Street, a contract for the construction of a three-story core and pattern shop with 24,000 ft. of floor space. Joseph P. Kennedy is president of the foundry.

The Baltimore Car & Foundry Company, Curtis Bay, Md., which is being enlarged, is understood to be planning the construction of a rolling mill.

Orders are continuing to pour in on the National Enameling & Stamping Company, 1901 Light Street, but it is stated no additional machinery will be required at this time.

An addition to cost $100,000 will be built to the plant of the Standard Guano Company, Curtis Bay, Md. The offices are in the Continental Building, Baltimore.

Additional equipment will be installed in the municipal pumping station, Easton, Md.

H. P. Wilder, Cambridge, Md., is seeking prices on machinery for a fruit evaporating plant.

The Duristo Paint Company, Newport News, Va., has been incorporated with a capital stock of $25,000 by Harry Reyner, J. B. Weaver, and others.

The Standard Box & Lumber Company, Lynchburg, Va., has been incorporated with $15,000 capital stock. F. C. Dickerson is secretary-treasurer.

The Ball Grain Explosives Company has been incorporated with $750,000 capital and a plant will be established near Wilmington, Del. It will be headed by Ernest DuPont. E. W. Wilson, Land Title Building, Philadelphia, is one of the incorporators. It is stated the plant will manufacture explosives for blasting and engineering work only.

The Empire Rifle Syndicate, New York City, has been incorporated at Dover, Del., to engage in manufacturing all kinds of firearms. The incorporators are Homer Beaudit, G. F. Richmond and DeForest Lillis, all of New York.

A building will be erected at 1112-1116 Cathedral Street, Baltimore, for the manufacture of plate glass frames, etc., by Chaudron & Co., 217 West Camden Street, Baltimore.

A garage, which will be equipped with modern machinery, is to be erected at Charles and Oliver streets, Baltimore, for the use of the Winton Automobile Company. William L. Duck is manager.

Additional machinery will be installed to increase the output of the Security Cement & Lime Company, 116 West Washington Street, Hagerstown, Md.

A cold-storage plant will be built by D. Ramacciotti, Public Square, Hagerstown, Md.

The Garrison Construction Company of Baltimore City has been incorporated with $5,000 capital stock to engage in all kinds of construction work by W. Fred Groscup, St. Paul and Twenty-sixth streets, Baltimore, Paul B. Mules and E. J. Ellinger.

The Hull-Salmon Mfg. Company, Baltimore, has been incorporated with capital stock of $3,500 by W. Scott Hull, E.

Q. Salmon and Benjamin Collinston, Jr., to engage in the manufacture of safety appliances.

Motors and other machinery at the boiler plant of the E. J. Codd Company, Fourth and Toone Streets, Canton, Md., were recently damaged by fire and water.

The Keystone Steel Casting Company, Chester, Pa., has started the construction of an addition to the main building. Bids are being received for new furnaces. It is understood that about $30,000 will be spent for improvements.

A canning plant at Smithburg, Md., is planned by the Williamsport Canning Company, Williamsport, Md.

Additional machinery will be required for extensions to be made by the Beacon Light Company, Chester, Pa., to enable it to supply a large amount of power to the new plant of the Remington Arms Company, Marcus Hook.

Chicago

CHICAGO, ILL., Aug. 30, 1915.

Manufacturers of ammunition are resorting to a variety of devices to secure machine-tool equipment adequate to their needs. A large manufacturer at Milwaukee has placed an order for 1000 lathes with neighboring manufacturers, none of whom is a regular builder of lathes. The Giddings & Lewis Mfg. Company, Fond du Lac, Wis., is building 100 lathes. Inquiry for tools other than as occasioned by war operations is still the exception. The Phoenix Mfg. Company, Eau Claire, Wis., is in the market for planers, and the Kokomo Brass Works, Kokomo, Ind., expect to buy screw and milling machines, lathes and foundry equipment. The Blount Plow Works, Evansville, Ind., has not determined upon the details of the equipment to be purchased in connection with its plant extensions but a considerable quantity will be required. Crane builders report a decided increase in orders. In the smaller communities manufacturers are experiencing some difficulty in securing sufficient labor.

The South Ottawa Threshing Company, Ottawa, Ill., has taken out a charter providing for a capital of $15,000 and will engage in the manufacture of threshing machines. The incorporators are W. H. Watts, W. F. Watts and George T. Shute.

Plans are being formulated looking to the reopening of the plant of the Bonner Mfg. Company, Champaign, Ill., the works having been closed for some time following receivership proceedings.

Construction of the new plant of the Crescent Forge & Shovel Company, Havana, Ill., of which mention has been previously made, is now well under way. The building is to be of steel and concrete, fireproof construction.

The Keystone Steel & Wire Works, Peoria, Ill., has awarded a contract for a new building, 80 x 250 ft., two stories, to be used as a warehouse and gate factory. This is in addition to other construction under way at the company's works.

The National Tube Company, Kewanee, Ill., is about to add to its foundry department and in this connection will install sanitary equipment estimated to cost $25,000. A new forge shop to manufacture parts of steel unions is in progress.

Howard Mann, Kankakee, Ill., has perfected an automatic lathe for the manufacture of shrapnel and is letting contracts for its manufacture.

The Buda Company, Harvey, Ill., in increasing its foundry capacity, installing a second cupola, which will increase its melt to 35 tons per day.

The Holmes Garage Company, Danville, Ill., has been organized with a capital of $21,000 by G. W. Holmes.

The Illinois Zinc Company, LaSalle, Ill., is making additions to its plant which will cost in the neighborhood of $50,000.

The Hammond Malleable Iron Company, Hammond, Ind., will build two additions to its plant, one to be used as a stock room and the other as a core room.

The Winona Pulp & Paper Company, Winona, Minn., will erect a paper manufacturing plant. The warehouse, power plant and break room will be erected this fall but the main building will not be started until later.

The Michigan Crown Fender Company, manufacturer of automobile fenders and metal stampings, is to locate at Ypsilanti, Mich., and will occupy a building 80 x 400 ft., to be erected for it.

Fuller & Sons Mfg. Company, Kalamazoo, Mich., manufacturer of auto parts, will build a four-story addition, 61 x 100 ft., in which will be installed new machinery still to be purchased.

Carroll F. Sweet, R. F. Smith and L. B. Littell are completing arrangements for the organization of a company with a capital of $12,000, to engage in the fabrication and erection of structural steel, with shops at Grand Rapids, Mich.

The Michigan Hearse & Motor Company, Grand Rapids, Mich., has taken out a permit covering the erection of a three-story brick factory to cost $12,000.

The Gilmore Mfg. Company, Burlington, Iowa, has acquired the plant of the Orchard City Wagon Company, where it will manufacture farm implements.

The Johnson Electric Smelting Company, Byron E. Eldred, president, announces that it will build a plant for the electric smelting of ores at Keokuk, Iowa, the original installation to cost $75,000.

The Zimmerman Steel Company, Davenport, Iowa, the construction of whose new plant is under way, is now considering types of heating furnaces to be installed, and press equipment.

The Iowa Foundry & Furnace Company, Nevada, Iowa, has purchased the plant of the Lennox Machine Company, Marshalltown, Iowa, which it will consolidate with its own plant. W. J. Heald is president of the company.

The Perfection Tire & Rubber Company, Fort Madison, Iowa, recently received orders for tires to be manufactured at the rate of 1000 per day for a period of five years. Work is being rushed on the new buildings that the company will occupy.

The Plattner-Yale Mfg. Company, Lincoln, Neb., has completed plans for its new factory, which will include a machine shop, 52 x 200 ft., and a foundry, 50 x 150 ft., the latter to include a core room and brass foundry. The buildings are expected to cost $50,000. The Plattner-Yale Company has been located at Denver and is a manufacturer of implements.

The Boyer-Rhodes Machinery Company, 311 Virginia Avenue, Joplin, Mo., has been organized to deal in new and second-hand machinery and in addition to operate a machine shop.

The Jackson Compressor Company, Denver, Col., has announced its intention of building a new plant in that city, which it will operate in addition to its present capacity. H. O. Jackson is president and the present offices of the company are at 1130 Twelfth Street.

The Duluth Ice Company, Duluth, Minn., is to build an artificial ice plant to cost $80,000.

The Rex Mine, Wallace, Idaho, suffered a loss of $15,000 through the destruction by fire of its air compressor plant, the machinery damaged including a 15 drill compressor, 200 hp. motor, boilers and auxiliary apparatus.

The Western Sugar Company, Salt Lake City, Utah, will build a beet sugar refinery at Medford, Ore., the plant to cost in the neighborhood of $600,000.

Milwaukee

MILWAUKEE, WIS., Aug 30, 1915.

The month of August has been one of the most encouraging periods for Milwaukee and Wisconsin metal-working industries in more than two years. The volume of bookings and deliveries runs far above that of the corresponding month of 1914, although not much more than equal to previous years. Nearly every line of trade reports better business, except those affected by the seasons, which have much complaint to make because of unsatisfactory weather conditions. According to William J. Fairbairn, secretary and manager of the Milwaukee Metal Trades & Founders Association, the operations of members range from 75 per cent of normal to 50 per cent overtime, and every man of average ability who applies for work is given a job. Foundrymen are especially active at the close of August. The structural trade is improving as the result of the commencement of projects long delayed by the depression. At Madison machine shops are so busy that the annual picnics for employees have been called off lest a day be lost. Machinery jobbers are finding a splendid market in the garage field. Scores of new garages, with small machine shops in connection, are going up. This is also helping to clean up the stocks of used light machinery and small power tools. On heavy equipment, dealers in second-hand machinery are sold out.

The Linde Air Products Company has purchased a site at National and Thirty-eighth avenues, Milwaukee, and the work of erecting buildings will be started as soon as plans can be drawn and contracts awarded. The plant will be the fifteenth erected by the company.

The Bayley Structural Iron Company, Milwaukee, was awarded the contract for structural and ornamental iron for the new factory to be erected for the Phoenix Knitting

Company at Milwaukee and Chicago streets, Milwaukee. A. K. Roberts was awarded the steel sash and the Brodesser Elevator Company the elevator work. The building will cost about $250,000 complete. Kirchoff & Rose are the architects.

Theo. A. Schumann will erect a $5,000 garage and machine shop on Third Street, near Center Street, Milwaukee.

John S. Spaulding will build a machine and blacksmithing shop at Marshfield, Wis.

The Felker Brothers Mfg. Company, Marshfield, Wis., manufacturer of steel culverts, barn equipment, etc., is ready to start work on a steel-trussed concrete factory addition, 42 x 84 ft., to be equipped exclusively for making culverts. Machinery is now being purchased.

The R. & W. Garage Company, New Richmond, Wis., has broken ground for a new garage and machine shop, 66 x 124 ft., one story and basement, with steel-trussed roof. About 25 tons of structural material is required.

The Oil Gas Machine Company, Milwaukee, has been incorporated by Ernest O. Linton, Frank J. Blum and Harry M. Wisk to manufacture machinery. The capital stock is $25,000.

Tegs Brothers, 1157 Second Street, will build a new garage and repair shop, according to plans by Hugo V. Miller, architect.

The Thomas S. Watson Company, consulting engineer, 1112 Majestic Building, Milwaukee, is taking bids for the installation of steam heating plants in the wood-working factory of the Rockwell Mfg. Company, now being rebuilt, and the foundry addition for the Federal Malleable Company, both in Milwaukee.

The city of Waukesha, Wis., will build a new high school costing $100,000; a new graded school costing $50,000, and a central heating and power plant costing $25,000. E. R. Estberg is mayor.

The Nyborg Mfg. Company, Withee, Wis., is preparing to erect a factory for the production of washing machines which have been built in leased quarters for some years. J. C. Nyborg, president, is about to market numerous other inventions.

The Bradley Garage & Machine Works, Oconto, Wis., will build an addition, 40 x 60 ft., to be used for repair and machine work. Harry Bradley is chief owner.

Joseph D. Salkowsky, Kewaunee, Wis., will build a new garage and repair shop.

The Milwaukee Die Casting Company, occupying the basement of the Manufacturers' Home Building, foot of Mason Street, Milwaukee, will move about Nov. 15 to its own home, now under construction on Fourth Street. The foundry will be 50 x 60 ft., of brick and mill construction. The company manufactures die castings in aluminum, babbit, bronze, brass and copper.

The Steerautomat Company, Beloit, Wis., organized several months ago to manufacture a malleable iron device for automobiles, is meeting with such good business that it has been decided to double the capacity of the shop.

Louis Boldig and H. R. Swanke, Tigerton, Wis., are about to erect a small factory for the manufacture of farm wagons, upon which Mr. Boldig has been granted patents in the United States and Canada. They expect to use a considerable tonnage of castings, which will be furnished under contract with foundries.

The Geuder, Paeschke & Frey Company, Milwaukee, manufacturer of tin, sheet-iron and enameled products, has declined several tenders of large orders for war munitions and publicly announces a policy of maintaining its usual line of products. The company recently purchased the National Blower Works, adjoining its plant, and is engaging extensively in the production of sheet-metal automobile specialties, such as mufflers, gasoline tanks, light stamped parts, etc.

C. O. Vivian will build a garage and reair shop at Mineral Point, Wis., on the site of the Lanyon foundry and machine shop, which will be razed.

The factory building at 314-316 East Water Street, Milwaukee, has been purchased by William G. and Edmund R. Spence, officials of the Rundle-Spence Mfg. Company, Milwaukee, who recently incorporated the Turbo Motor Devices Company to manufacture carburetors and other devices for internal combustion engines. The building will be remodeled for use at once.

The Milwaukee Auto Engine & Supply Company, Milwaukee, has filed notice of an increase in its capitalization from $5,000 to $30,000.

Indianapolis

INDIANAPOLIS, IND., Aug. 30, 1915.

The Indiana Tool & Machinery Company, Indianapolis, has been incorporated with $10,000 capital stock to manufacture tools and machinery. The directors are A. G. Berg, Carl Schubert and Hugo Miller.

The Meridian Mfg. Company, Indianapolis, has been incorporated with $75,000 capital stock to manufacture automobiles. The directors are Elmer Hinshaw, E. W. Hughey and H. M. Callahan.

The Van Briggle Motor Device Company, Indianapolis, Ind., has been organized with a capital of $150,000 to manufacture a new type of carburetor. The company is promoted by L. H. Van Briggle.

The Haynes Automobile Company, Kokomo, Ind., has awarded contracts to the Pan-American Bridge Company, Newcastle, Ind., for three steel and concrete factory buildings, which will be erected at a cost of $50,000.

The Knerr Board & Paper Company, Kokomo, Ind., which has been closed for several weeks, has been bought by the Mid-West Box Company, Anderson, Ind., and the capital stock of the latter has been increased from $100,000 to $300,000.

The Kokomo Canning Company's plant, Kokomo, Ind., was destroyed by fire Aug. 23. The loss on the plant itself was about $60,000.

The Plymouth Mfg. Company, Plymouth, Ind., has increased its capital stock from $50,000 to $65,000.

The Town Board of Ladoga, Ind., has bought a site for a municipal waterworks plant. Work on the plant will begin as soon as the public utilities commission approves the purchase of the land.

The Foster Machine Company, Elkhart, Ind., which builds machines on contract, is making the sixth addition to its local plant in the last six months. Much of its attention is devoted to the manufacture of screw making machines that are used in munition factories in England.

Riedman Brothers, Brookville, Ind., have received the contract for building the new waterworks station there for $7,152.

N. A. Klein and Charles Anger have completed plans for an iron and brass foundry at Madison, Ind. Two cupolas and two brass furnaces will be installed.

The Griff-Kimberly Lawn Mower Company, Anderson, Ind., is adding to its machine equipment for the manufacture of lawn mowers.

The Burnall Sales Agency, Logansport, Ind., has been incorporated with a capital of $10,000 and will manufacture devices for fuel economy. The company is organized by A. F. Cogan and S. B. Matthews.

Detroit

DETROIT, MICH., Aug 30, 1915.

The McCord Mfg. Company, Detroit, manufacturer of automobile truck accessories, has purchased the large plant of the Tilden Saw Company, Wyandotte, Mich., and will increase its facilities.

The Tilden Saw Company, Wyandotte, Mich., is erecting a new factory at Artillery and Fort streets, Detroit, and expects to occupy the new plant Oct. 15. The company will be able to increase its output by the move.

The Jiffy Starter Company, Detroit, has been incorporated with $15,000 capital stock by Robert Wachman, Henry Platz and Percy Shekell. The company will engage in the manufacture of starters for automobile and marine engines.

The Fentress-Newton Company, Detroit, has been incorporated with $20,000 capital stock to manufacture motorcycle accessories. The incorporators are Frank P. Fentress and Joel C. and R. B. Sage.

The Hasseldahl-Lane Company, Detroit, has been incorporated with $6,500 capital stock to manufacture plumbing and heating supplies. The incorporators are Henry N. Hasseldahl, Charles A. Lane and Joseph H. Pohl.

The Abbott Stamping Company, Detroit, has been organized by Charles S. Abbott, B. B. Bennett and F. B. Borlean to manufacture automobile license tags. The new company has acquired a factory and has installed modern stamping and enameling equipment.

The D'Arcy Spring Company, Kalamazoo, Mich., will double its present output and is installing additional machinery.

The Lewis Spring & Axle Company, Jackson, Mich., has purchased the extensive plant formerly occupied by the

Glazier Stove Company at Chelsea, Mich. The company will utilize the newly acquired plant in the manufacture of automobiles.

The Novo Engine Company, Lansing, Mich., manufacturer of gas engines, is erecting a large addition to its plant which will afford the company 16,000 sq. ft. additional space.

The American Forging & Socket Company, Pontiac, Mich., which was recently incorporated with $100,000 capital stock, has purchased the plant of the Michigan Oak Flooring Company and will erect an addition thereto containing about 15,000 sq. ft. of floor space. The company manufactures automobile sockets.

Cleveland

CLEVELAND, OHIO, Aug. 30, 1915.

The foreign demand for turret lathes for use in making war material is again very active after having quieted down somewhat for a short time. A very large inquiry is pending from Russia and other inquiries have come recently from Italy, India, and other countries, and among late orders is one from Australia. The demand for automatic machinery continues heavy. This demand is mostly from domestic sources, foreign orders having dropped off. A local builder of automatics reports that its August business has been as large as during any previous month and that on some sizes of machines it cannot make deliveries until next May or June. A Cleveland builder of drill presses is now sold up until February in spite of the fact that the capacity of its plant has been doubled within the last few months. It is estimated that not more than 5 per cent of its orders for drilling machines can be attributed directly or indirectly to war business. The inability of makers of standard machines to furnish early deliveries has created a renewed heavy demand for second-hand machinery and the high prices that are being paid for used machinery is bringing on the market considerable second-hand machinery. Some orders for additional machines are coming from companies having shrapnel contracts that find their present equipment inadequate. Among orders placed during the week was one for considerable standard tool equipment for the Cleveland-Canton Axle Company, Canton, Ohio, which is enlarging its capacity. The demand for punching and shearing machinery is very good. A satisfactory volume of crane business is coming out and a heavy demand has sprung up for small trolleys. The Cleveland Crane & Engineering Company, Wickliffe, Ohio, has taken an order for six cranes for the rod mill of the Youngstown Sheet & Tube Company. Generally the machine-tool business is well scattered among all classes of buyers with the exception of the railroads.

The paragraph published on page 452 of the issue of THE IRON AGE of Aug. 19, stating that the plant of the Avery Stamping Company, Cleveland, had been sold to the Moline Plow Company, Moline, Ill., and would be used by the purchaser in making shrapnel, is incorrect. Authentic advices state that the Cleveland Trust Company, receiver, sold to B. F. Peek, vice-president of Deere & Co., Moline, Ill., and others, all the equipment of the plant of the Avery Stamping Company and leased to them the company's plant for one year with option of renewal. The Moline Plow Company had no hand in the deal.

The Perfection Spring Company, Cleveland, will enlarge its plant by the erection of a one and two-story building.

The John's Machine & Stamping Company, Cleveland, has been incorporated with a capital stock of $100,000 by Patrick J. Lavey, M. M. Feidner, and others.

The Chamber of Commerce, Salem, Ohio, has entered into a contract with several Pittsburgh men which is expected to result in the erection of a new rubber plant in Salem for the manufacture of automobile tires. The company will be known as the Porter Rubber Company and will be incorporated with a capital stock of $125,000. The contract provides that the Chamber of Commerce will furnish a site and give a bonus of $17,500.

H. H. Hughes has been appointed receiver of the Canton-Hughes Pump Company, Wooster, Ohio. The liabilities are placed at $75,000 and the assets at $50,000. It is stated that the company has been hampered because of lack of working capital. The operation of the plant will be continued and the plant will probably be sold.

The plant of the Unzinger Razor Blade Company, Fremont, Ohio, was badly damaged by fire recently, the loss being about $12,000.

A new plant for the manufacture of paving blocks will be established near New Philadelphia, Ohio. J. DeWitt is promoter of the company.

Otto and Sol Krupp, Carey, Ohio, have purchased the machine shop of W. H. Phelps at Upper Sandusky, Ohio. The plant will be placed in operation on war orders recently secured by the new owners.

The Alliance Engineering Company, Alliance, Ohio, advises that the building to be erected as an addition to its plant will be 120 x 380 ft., and not 120 x 200 ft., as recently stated.

The Dennison Foundry & Machine Company, Dennison, Ohio, has increased its capital stock from $40,000 to $75,000. The capacity of the company's foundry will probably be enlarged.

Bids will be received shortly by C. L. Shafer, Belleville, Ohio, for the construction of a waterworks system to include a deep well pump, a gas engine, etc. The Smith & Boulay Company, Nasby Building, Toledo, Ohio, is the engineer.

The Interstate Iron & Steel Company, Chicago, Ill., has not yet reached a decision regarding the rebuilding of its rerolling bar mill at Cambridge, Ohio, which was recently damaged by fire. The company has received an offer from Columbus, Ohio, to locate the plant in that city.

The Northwestern Brush Company, Toledo, Ohio, is being formed by E. P. Usher and others to establish a brush making factory. The company has temporary offices at 1207 Ohio Building, Toledo.

The Ohio Machine & Tool Company, Kenton, Ohio, will enlarge its plant by the erection of an addition, 60 x 80 ft. The company is at present operating its plant night and day.

Cincinnati

CINCINNATI, OHIO, Aug. 30, 1915.

It is an open secret that many manufacturers of War munitions in the Central West have experienced unlooked for difficulties and delays in filling orders. The right specifications that must be followed out have deterred quite a number of other manufacturers in accepting contracts, although it is well known that there is considerable of this business to be obtained. The foreign demand for machine tools has slackened the past few days, and domestic business is also quite dull, but this condition is doubtless of a temporary nature. Makers of metal-working machinery are very busy. Small generators and motors, as well as portable electric tools, are now in good demand. Wood-working equipment is dull.

Smoke abatement fights being waged in nearby cities have created a demand for automatic stokers. The following companies at Columbus, Ohio, have announced their intention of installing stokers in their plants at an early date: Kilbourne & Jacobs Mfg. Company, Jeffrey Mfg. Company, Columbus Railway, Power & Light Company, Capital City Dairy Company, Columbus Packing Company, Franklin Brewing Company, Standard Chain Company and Solar Metal Products Company.

The Copp Stove Company, Ltd., Fort William, Ont., is buying a large number of machine tools in this market and will soon issue a further list for lathes and milling machines.

The Stuebing Truck Company, 308 Walnut Street, Cincinnati, is installing machinery for the manufacture of a special metal lift-truck, and in the list of equipment still wanted are two small speed lathes and an upright drilling machine.

The Automatic Transportation Company, Buffalo, N. Y., is inquiring in this market for the following machine tools: One 16-in., one 18-in. and one 24-in. lathe and one heavy duty drilling machine.

Joseph Reichert, Cincinnati, is to head a company recently formed to erect a 50-ton ice plant in North Cincinnati. Most of the necessary equipment has already been bought.

The Pothoff Construction Company, Cincinnati, has been awarded contract for the fabrication and erection of a plant for the Curtis Bay Distilling Company, on lower Baltimore harbor, Baltimore, Md. It will require a large tonnage of structural steel and will cost $1,000,000.

It is reported that the Acme Machine Tool Company, Cincinnati, has leased part of the automobile plant of Haberer & Co., on Gest Street, and will use it for the manufacture of screw machine parts.

A representative of the Russian Government was in Cincinnati last week and placed a number of orders, included in which was a very large one for laundry machinery to be installed in hospitals. He also bought quite a number of portable electric drilling machines.

A. F. Shepherd, president of the Ohio Board of Administration, Columbus, Ohio, will open bids Sept. 10 for two 400-hp. water-tube boilers complete with stokers, to be installed at the Ohio Hospital at Gallipolis, Ohio. On the same date he will also open bids for nine automatic side-feed self-cleaning stokers to be installed in a hospital at Columbus.

The Dayton Steel Foundry Company, Dayton, Ohio, is making a large addition to its plant in which will be installed an electric furnace and overhead crane with lifting magnet and other equipment.

The Dayton Malleable Iron Company, Dayton, Ohio, recently received an order from Detroit automobile manufacturers calling for 3000 tons of castings.

The Concrete Steel Construction Company, Dayton, Ohio, has been awarded contract for the addition to the Platt Iron Works Company, Dayton, recently mentioned as contemplated. The proposed structure will be 125 x 300 ft., one story, of brick and steel construction.

The proposed foundry addition to the plant of the Nolte Brass Company, Springfield, Ohio, recently mentioned, will be 45 x 210 ft., one story, of brick and steel construction.

The Dayton Flatiron Works Company, Dayton, Ohio, has let contract for an addition to its plant that will be 125 x 300 ft., one story, of regular mill construction. It is rumored that the company has lately taken a contract for war munitions.

The Denison Foundry & Machine Company, Denison, Ohio, has increased its capital stock from $40,000 to $75,000, and will probably make some extensions to its plant at an early date.

The Novelty Stamping Company, Bellaire, Ohio, will make some additions to its plant. Details are not yet available.

The Central South

LOUISVILLE, KY., Aug. 30, 1915.

The past month has been one of the best the machinery concerns in this market have experienced at this season for a number of years. Trade has been picking up in all directions, and the fact that business men in the cotton district take it for granted that ways and means of financing the cotton crop will be found has helped to keep things moving there. The demand for machine tools continues strong. A local machinery manufacturer who has been in the market for a lathe reports that he has been unable to get delivery on the equipment before next May, a fact which suggests the volume of business which machine-tool houses have on their books. Wood-working machinery continues to sell well, while refrigerating equipment is also unusually active for this time of the year.

The permanent exposition of Louisville products has been established in the Arcadia Building, and will be opened in a few weeks. Among the concerns to be represented with exhibits are the James Clark, Jr., Electric Company, Dow Wire & Iron Works and the Standard Sanitary Mfg. Company.

J. L. Martin, Horse Cave, Ky., is engineer for a waterworks plant which is to be constructed at Munfordville, Ky. A pump with a capacity of 180 gal. per min. is the chief item of equipment to be purchased.

The Blue Diamond Coal Company, Hazard, Ky., has been organized with H. H. Braden, secretary and treasurer. Development work will begin at once.

The Kentucky Block Coal Company, Hazard, Ky., has been formed with J. B. Allen vice-president and general manager, for the purpose of developing a 500-acre coal tract. Mining and power equipment will be bought at once.

The Sampson Tobacco Company, Glasgow, Ky., is planning to build and equip a plant for the manufacture of wooden boxes. Work on the buildings has already begun.

Junction City, Ky., is arranging for the installation of an electric light plant. Address the mayor.

The Kentucky Utilities Company, Lexington, is arranging to purchase the plant of the Cynthiana Electric Light Company and to install new equipment throughout.

The Madison Company, Richmond, Ky., is purchasing equipment for an automobile garage.

Field & Co., Owensboro, Ky., has taken over the plant of the People's Ice Company, and plans to install additional equipment.

R. D. King and C. F. King, Owensboro, Ky., are in the market for equipment for an automobile garage and repair shop.

Bolliver Mills and Gus Neal, Uniontown, Ky., are purchasing equipment for a wood-working shop.

Letcher County, Ky., is in the market for road building machinery. Address County Judge Henry T. Day at Whitesburg.

The Southern Iron & Fuel Company, Birmingham, Ala., is reported to have plans for the development of a large manganese property at Carson Springs, Tenn.

The West End Woodworking Company, Petersburg, Va., whose plant was recently burned with $6,000 loss, has announced that it will rebuild.

The Seaboard Air Line Railway, with general offices at Norfolk, Va., will build and equip machine shops at Portsmouth, Va., to replace those which were recently burned. The Christian Construction Company, Durham, N. C., has the contract for a steel-frame machine and erecting shop, steel-frame blacksmith shop, flue shop building, engine shop, carpenter shop, power-house substation, etc. The equipment for these buildings will cost in the neighborhood of $300,000. Individual motors will be installed. The car and locomotive building and repair facilities of the shops will be increased 50 per cent. W. D. Faucette is chief engineer.

H. Oliver Lyne, Fredericksburg, Va., will build an electric light plant, for which a franchise has just been granted.

The City Point Ice Corporation, Hopewell, Va., will build an ice factory at a cost of $50,000. It will be equipped for a production of 50 tons a day. A cold storage plant will be operated in connection with it. Boilers, etc., will be needed, besides special equipment. R. W. Herfurth, Alexandria, Va., is president.

A. T. Quick, Lynchburg, Va., is in the market for power and wood-working machinery for a cedar lumber plant which he plans to install at Fredericksburg, Va.

William H. Lauff, Ford Jones and Frank McNeill are the names of those interested in the erection of a new wooden box factory at Johnson City, Tenn., reference to which was recently made.

The Florence Pump & Lumber Company, Memphis, Tenn., has decided to enlarge its capacity. Additional buildings will be erected and new machinery installed.

The Pubic Light & Power Company, Shelbyville, Tenn., is planning the erection of a brick and concrete power plant, 31 x 160 ft.

St. Louis

ST. LOUIS, MO., Aug. 30, 1915.

Inability to make desired deliveries continues to be accentuated in the machine-tool market and in consequence the demand, increased though it is but not yet up to normal, is becoming something of a problem to handle. Dealers are encouraged by the improvement in inquiries and delivery difficulties are believed likely to bring out further demand from industries which are perceiving the danger as to delays which they may encounter if they further postpone coming into the market. The inquiries continue for single tools and small lots of equipment generally, but the demand is more widespread and the total much greater than for many months. Second-hand tools are in more request and harder to get.

The Grand River Coal Company, organized under the laws of Delaware, has been authorized to use $25,000 in mining operations at Cainsville, Mo., where offices have been established. Power and mining equipment will be required.

The Forsythe Mining Company, Carthage, Mo., has increased its capital stock from $10,000 to $17,000 to purchase additional power and mining machinery.

A pearl button factory of large capacity is being organized for Springfield, Mo., with the details in the hands of the Young Men's Business Club of that city.

The Fayette Brick & Tile Company, Fayette, Mo., has been incorporated with a capital stock of $25,000 by Carl Jaeger, W. J. Megraw, L. W. Jacobs and T. W. Crump.

The Johnson County Light & Power Company, Knobnoster, Mo., will install a plant to cost about $10,000. J. J. Freundlich, Republic Building, Kansas City, Mo., should be addressed.

The Shelino Mining Company, Joplin, Mo., will install the necessary power and other equipment for a concentrating plant to handle 200 tons of ore every eight hours.

The Joplin Concentrating Company, Joplin, Mo., has been incorporated with a capital stock of $13,000 by T. B. Jenkins, J. S. Allington and F. A. Wilbur.

Conveyor coaling and sanding stations, with necessary mechanical equipment, will be installed at Willow Springs, Mo., and Tulsa, Okla., by the St. Louis & San Francisco Railroad Company. V. K. Hendricks, St. Louis, chief engineer, is in charge.

The city of Eldorado Springs, Mo., will expend $15,000 extending its waterworks pumping plant. O. E. Siders, city clerk, should be addressed.

The G. M. Ditto Mfg. Company, Joliet, Mo., has been incorporated with a capital stock of $25,000 by G. M. Ditto, H. A. Fraser and T. H. Brace.

The Harrison Machine Works, Belleville, Ill, is considering removal to Tulsa, Okla., together with the addition of considerable equipment upon removal.

The Little Rock Pickery & Reginning Company, Little Rock, Ark., has been incorporated with a capital stock of $25,000 by C. C. Kavanaugh, F. L. Graham and George C. McCardell.

James Gould will rebuild his cotton gin and saw mill, recently burned, at Noble Lake, Ark., with a loss of about $10,000 on machinery.

The Arkansas Light & Power Company, Arkadelphia, Ark., has increased its capital stock from $650,000 to $2,250,000 to extend its operations. H. C. Couch is president.

The Brinkley Water & Light Company, Brinkley, Ark., will extend its service to adjoining towns and will increase its equipment therefor.

The Marco Mill, Pine Bluff, Ark., will expend about $20,000 on the equipment of a flour mill and grain elevator. Elmo Marsh is president.

A hardwood mill of 50,000 ft. daily capacity will be equipped at once at Arkadelphia, Ark., by J. G. Clark & Son.

The Arkansas Construction Company, Little Rock, Ark., has been incorporated with a capital stock of $25,000 by Lemuel T. Osborn, R. S. Wilson and Louis W. Raben and will be in the market soon for concrete mixers and other equipment.

E. S. Cunningham will equip a large steam laundry at Little Rock, Ark., requiring considerable machinery.

The Buick Auto Company branch at Little Rock, Ark., will equip a large repair shop and garage and is reported in the market for lathes, drill presses and other equipment.

The city of Adamson, Okla., will equip an electric light and power plant and will receive bids until Sept. 20. The mayor is in charge.

The Caddo Power Company, Caddo, Okla., will equip an electric light and power plant under a franchise granted by the city.

The Citizens Light & Power Company, Drumright, Okla., has been incorporated with a capital stock of $50,000 by John H. Perry, L. E. Gibson and O. C. Elliott.

The Economy Lighting & Mfg. Company, Oklahoma City, Okla., represented at Hitchcock, Okla., by Thomas & Ritchie, has plans for the installation of an electric light and power plant at Hitchcock.

A municipal electric light and power plant is to be equipped at Soper, Okla. The mayor should be addressed.

The Cosden Company, Tulsa, Okla., has plans for a lubricating oil plant to cost about $200,000, equipment for which is now being sought.

The city of Pass Christian, Miss., will equip an electric light plant, construct waterworks, etc., at a cost of about $100,000. K. A. Kramer, Magnolia, Miss., is engineer in charge.

The L. N. Dantzler Foundry & Machine Works, Gulfport, Miss., will install additional equipment for the manufacture of shrapnel and other war munitions.

The United Saw Mills Company, New Orleans, La., is in the market for a band saw mill outfit of 40,000 ft. daily capacity, equipment to include everything.

The Lake Charles Auto Supply Company, Lake Charles, La., has been incorporated with a capital stock of $10,000 by S. Woodring, C. W. Hampton and Theodore Frank and will equip a repair plant.

The Johnson-Grayson Company, Houghton, La., has been organized to build a large sawmill. T. S. Grayson is president.

The St. Louis Lead & Zinc Company, St. Louis, Mo., has been incorporated with a capital stock of $10,000 by A. B. Hamilton, A. W. Sanders, T. E. Newbery, and others.

The Riverside Mfg. Company, St. Louis, Mo., has been incorporated with a capital stock of $16,000 by Louis Konze, Jabez R. Gadd, and others, and will equip a chemical manufacturing plant.

O. W. Sparks will build a concentrating plant of 400 tons daily capacity at Joplin, Mo.

Birmingham

BIRMINGHAM, ALA., Aug. 30, 1915.

There has been a steady sale of equipment for cottonseed oil mills and cotton ginning plants, and coal and ore mines have been in the market for machine tools. The agricultural demand is increasing. The volume of business is larger than it has been in over a year. The address of W. P. G. Harding of the Federal Reserve Board, to Alabama merchants at Birmingham, together with an encouraging message which he read from the President as well as one from Secretary McAdoo regarding the cotton situation and which have attained wide publicity in the South, followed by an agreement effected at a Southern bankers' conference held in this city to charge especially low rates of interest on loans on insured warehouse cotton and other Southern crops, had a most stimulating effect on all branches of trade, fully shared by the machinery business.

The Florala Sawmill Company, Paxton, Ala., will rebuild its burned planing mill and purchase new engines and boilers, etc. J. T. Hughes is general manager.

J. Marvin Lusk, Jacksonville, Ala., will rebuild his burned sawmill.

The Atlanta Warehouse & Compressing Company, Atlanta, Ga., will at once build a cotton warehouse and compress for this year's business, expending $500,000. It will have a capacity of 200,000 bales. The capital stock of the company is $100,000.

The Hodgson Oil Refining Company, Athens, Ga., has been incorporated with a capital stock of $100,000 by E. R. Hodgson, H. H. Gordon, Jr., and others, and will establish a cottonseed oil mill.

The Ocilla Oil & Fertilizer Company, Ocilla, Ga., has increased its capital stock from $100,000 to $500,000, and will add an ice and cold-storage plant and may add an oil refinery.

Baxton Bros., Tifton Ga., will establish a sawmill with a daily capacity of 70,000 ft.

The Rynetree Mfg. Company, Atlanta, contemplates establishing a new rope and cotton bag factory.

A plant for the manufacture of roofing tile will be established at Orlando, Fla., by S. A. Duncan, W. W. Whitaker, both of Atlanta, and others.

The city of Pass Christian, Miss., plans to issue bonds for an electric lighting and waterworks system to cost $100,000. K. A. Kramer, Magnolia, Miss., is consulting engineer.

Texas

AUSTIN, TEXAS, Aug. 28, 1915.

The damage to the cotton crop caused by the recent tropical storm will be more than offset by the benefits produced by the heavy general rain. Trade in machinery and tools is very satisfactory, according to the statements of dealers.

The smelter of the American Smelting & Refining Company at El Paso will be equipped with additional machinery and improvements at a cost of about $300,000.

The Blumberg Motor Mfg. Company, San Antonio, has been organized with a capital stock of $25,000. It will manufacture motors. H. G. Blumberg is interested.

The F. E. Wiebush Gin Company will build a cotton gin at Mereta.

The Champion Gin Company, Champion, has been organized to build a cotton gin. J. H. Smith is interested.

The Socorro Light & Power Company, Socorro, N. M., has been organized for the purpose of building an electric light and power plant. It has a capital stock of $50,000. C. T. Brown is interested.

The Burdette Oxygen Company, which has a capital stock of $240,000, plans to build a large plant either at Dallas or Fort Worth for the manufacture of oxygen and hydrogen by a new process. Cloyd H. Read of Dallas, W. G. Newby of Fort Worth and Howard S. Cook of Chicago are interested.

The interurban railway companies having lines which enter Dallas have officially advised the city commission that they have united in plans for the construction of union terminals and a passenger station to cost approximately $1,250,000. The site for the proposed improvements has been purchased. The Stone & Webster Engineering Corporation, Boston, Mass., is chiefly interested in the projected improvements.

The Pacific Northwest

SEATTLE, WASH., Aug. 24, 1915.

Except for small repair-shop business, the machine-tool trade is now badly tied up for lack of stock. In most cases heavy metal-working equipment is not urgently needed, and while some inquiries are coming out most buyers prefer to wait rather than order for distant delivery at the present prices. Shops in several lines, however, are now quite well occupied; operations at most railroad shops are increasing, and the exceptional increase in ocean shipping is giving plants on tidewater a great deal of business, both in new construction and repairs. While some mills are shutting down, lumber activity is on the whole increasing, and a few important orders are being placed for mill and logging equipment. Waterworks improvements and other municipal improvements are being undertaken by many small towns in Oregon and Washington. The mine and smelter supply trade is more than holding its own. Recent forest fires in the northwestern part of Washington have destroyed millions of feet of fine timber, and a number of plants have been seriously damaged, with considerable loss of machinery and equipment. The unusual number of smut fires and explosions

in the harvest sections have destroyed so many threshing outfits that even the reserve stocks of the big implement dealers have become depleted, and it has been extremely difficult to secure on short notice the necessary equipment to continue the busy harvest season. Seattle manufacturers and jobbers doing business in the Orient find the present an opportune time for establishing trade in China, Japan and the Philippine Islands. The demand for machinery, equipment and electrical supplies is expanding rapidly, and the present war conditions in Europe have much restricted competition along the various lines.

Another tangible evidence of the active condition of the mining industry in the Northwest is the fact that the smelting plant at Northport, Wash., recently acquired by Day Brothers (operators of one of the big silver-lead mines in the Coeur d'Alene district), is to be equipped for much larger capacity. The plant is already prepared for copper smelting, and lead and zinc furnaces are to be installed. The plant has been idle since 1908, but will be immediately reopened.

A site has been selected for the huge manufacturing paper plant to be built in Albany, Ore., by the Thomas Pulp & Paper Company, financed by D. Thomas, principal stockholder. Announcement is made that about three billion feet of timber has been contracted for by the company for use in the proposed paper mill. The first unit of the plant will cover approximately 25 acres, and the buildings, machinery and equipment will represent an expenditure of $650,000.

The Hawley Pulp & Paper Mills, Oregon City, Oregon, which are being remodeled and reconstructed, will be ready for operation in the near future. New machines are to be installed for making tissue paper, and repair work, when completed, will cost about $30,000.

According to report, the Brooks-Scanlon Lumber Company, Minneapolis, will begin work within six weeks on the construction of a huge sawmill in Bend, Ore., with a capacity of 50,000,000 ft. annually. The company owns about 22,000 acres of timber in that vicinity. The plant will be located on the Deschutes River, opposite the site of the new Shevlin-Hixon mill. It will employ about 500 men.

The Salem Electric Broom Works, recently of Eugene, Ore., has opened a plant at 749 High Street, Salem, Ore. Machinery for the plant was shipped from Eugene. W. H. Aldaet is president and G. Peterson secretary of the company.

The Tacoma Central Heating Company, Tacoma, Wash., announces that work will start immediately on the central heating plant and distributing system to be built by the company. The work will cost between $200,000 and $250,000.

The plant of the Chehalis River Lumber & Shingle Company, Chehalis, Wash., has been sold for a consideration of $65,000, to E. R. York of Seattle. It is understood the new owner will make a number of improvements.

C. E. Stevens, St. Helens, Ore., plans to construct a 100 x 100-ft. machine shop and garage in that city. The structure will be one and one-half stories.

The Bend Water, Light & Power Company, Bend, Ore., according to Charles R. Brown of Chicago, president, will immediately proceed with a number of extensions and improvements to its plant and distributing system. The city voters recently defeated an electric franchise sought by outside parties, and the power company now announces that improvements will be made immediately.

The Eugene Electric Company, Eugene, Ore., is receiving bids for one 1500-kw. condensing turbine steam auxiliary plant, to be built at Eugene for the electric company, which is making a number of other improvements to its plant.

The Willapa Power Company, South Bend, Wash., announces that work will begin soon on the construction of the first unit of the big hydro-electric plant to be built on the South Fork. The company serves South Bend and surrounding territory.

The Libby Electric Light & Water Company, Libby, Mont., will make a number of improvements to the local plant, and extensions to the distributing system. Kirby & Reynolds, Sheridan, Mont., are owners of the company.

The plant of the Dominion Match Company, New Westminster, B. C., has been leased by the Laminated Materials Company, Boston, which has installed machinery and equipment and will immediately begin the manufacture of salmon can boxes.

The Fisher Mfg. Company, Reardan, Wash., recently incorporated, will erect a plant for the manufacture of a special type of wrench, of which Frank Fisher, president of the company, is inventor and patentee.

The Talkitna Lumber Company, Portage Bay, Alaska, will shortly begin construction work on a large sawmill plant to be erected in that city. W. L. Stevenson and Theodore Johnson are among the incorporators.

The Commercial Club of Great Falls, Mont., is negotiating with Henry H. Rolopp, Ogden, Utah, for the establishment of a beet sugar factory in that city. Several sites are now under consideration.

The Enterprise Mill Company, Port Orchard, Wash., has been incorporated with a capital stock of $20,000 by George Voon, George Mathey, Ray S. Fisher, and others. The company plans to construct a modern mill.

The city of Baker, Ore., has announced definite plans for expending about $6,000 in making improvements and extension to the municipal power plant. Some new machinery will be required, and the street lighting system will be improved.

The Antimony Smelting & Refining Company, Seattle, Wash., has been incorporated with a capital stock of $200,000. The company has leased the Van Assel plant of the Denny-Renton Clay & Coal Company, which covers several acres, and is equipped with a large amount of machinery necessary for reducing antimony. Some new machinery will be installed and other improvements made at the plant. W. D. Wood and H. Maynard Griffith are the incorporators.

The Eugene Iron Works, Eugene, Ore., have secured the contract for supplying the Oregon Power Company, Portland, with a carload of iron grates and feed holes to be used in the plants at Dallas and Springfield, owned by the power company. This business has heretofore practically all gone to San Francisco.

It is announced that the Brooks-Scanlon Lumber Company, Minneapolis, Minn., will shortly begin the construction of a two-band sawmill and box factory near Bend, Ore.

The concentrator, compressor, machine shops and heating plant of the Idaho-Continental mine, near Porthill, Idaho, which were recently destroyed by fire, are to be rebuilt.

Canada

TORONTO, Aug. 29, 1915.

The growing importance of Canada in the eyes of the other great portions of the British Empire is indicated in the fact that Canadian manufacturers are being invited to tender for large supplies of material required for the equipment of the Northwestern Railway of India. Thousands of brass and steel boiler tubes are called for.

W. W. Butler, vice-president Canadian Car & Foundry Company, Montreal, announces that an order for 100 box cars, to cost $100,000, has been received from the Alberta Great Waterways Company and the Edmonton, Dunvegan & British Columbia Railway. The company also secured an order from the same source for $10,000 worth of switch and frog material which will be manufactured by its subsidiary, the Canada Steel Foundries.

J. W. Pugsley, secretary of the Department of Railways and Canals, Ottawa, is calling for bids for the erection of an engine house, water tank, turn table, etc., for the Carleton Point Car Ferry Terminal, Prince Edward Island, until Sept. 8, 1915.

The Western Canada Flour Mills, Ltd., with head office at Toronto, is building 10 grain elevators in different sections of Alberta. In the following towns sites have been secured and building operations are in progress: Ensign, Kirkaldy, Champion, Dalmead and Fleet. The towns where the other five elevators are to be erected have not been selected. The elevators will have a capacity of 30,000 bu. each with flour house in connection. The cost of each elevator will be approximately $6,500. This program of construction will be carried out this year and the management states that a larger program will be undertaken in 1916.

It is announced that the National Steel Car Company, Hamilton, has received an order from the Edmonton, Dunvegan & British Columbia Railway for 10 stock cars, to cost $125,000.

The Canadian Locomotive Company, Kingston, has been securing a good deal of business, independent of war orders, according to authentic reports. It has made arrangements to manufacture for the Baldwin Locomotive Works, Philadelphia, its trucks in Canada. Since the company established an agency in London, it has through this source alone secured over $1,000,000 worth of business.

The Northern Bolt & Screw Company, Parry Sound, Ont., has purchased the plant and stock of the Dominion Bolt Company, Toronto, and is moving the machinery to its plant at Owen Sound. J. M. Kilbourn, president of the company, announces that further extensions will be made to the plant when business prospects are a little brighter.

The Canadian Horse Shoe Company, Ltd., which was recently incorporated at Hamilton, with a capital stock of $300,000, is erecting a plant which will represent an outlay

of $150,000. The plant will ultimately require the addition of a rolling mill.

The Town Council of Petrolea, Ont., ordered the Hydro Commission to proceed at once with the building of an entirely new plant for the distribution of power. Its cost will be about $15,000.

A Mr. Maxwell is interested in a company which is contemplating the erection of a steel plant at Oshawa, Ont., for the manufacture of structural steel. The plant will require a site of 200 acres and is asking the town for a bond security of $60,000, in return for which it agrees to erect a plant and employ 200 men at the start, which will be increased to 1500 when the plant is completed.

The Brantford Emery Wheel Company, Brantford, Ont., will build a small addition to its plant.

The Dominion Beet Sugar Company, Wallaceburg, Ont., is contemplating the erection of a large plant at Chatham, Ont.

The Lake of the Woods Milling Company, Montreal, will build an elevator at Foremost, Alberta.

It is reported from Winnipeg, that in many of the warehouses in Manitoba not a single binder, mowing machine, rake, disc harrow or cutter is left. The stupendous crop to be garnered is the reason given for the large demand for farm machinery. It is said such a crop year as this has never been seen in the Canadian West before. The implements which have experienced the largest sale are binders, mowing machines and horse rakes.

It is announced from Ottawa, that drastic amendments of the industrial disputes investigation act is foreshadowed for next session. At present the act applies only to public utilities, and the Minister of Labor is considering the extension of its application to firms engaged in turning out war munitions as well.

The Auto Light Gas Mfg. Company, Winnipeg, will build a new plant at 462 Lipton Street.

The Shell Oil Company, Burnaby, B. C., will spend $110,000 on improvements and buildings to be constructed at its plant as well as the erection of six tanks with a capacity of 5000 to 38,000 gal. each.

The ratepayers of Prince George, B. C., have passed a by-law to grant $80,000 for extensions and improvements to the waterworks plant and $45,000 for extensions to the electric light and power system.

Guelph, Ont., will spend $24,500 on extensions to be made to the waterworks plant. F. McArthur is the engineer.

Hugh McDonald, Embro, Ont., will install machinery and equipment for a general blacksmith shop in a building at Huron and Commissioner Streets.

The Toronto Hydro Commission, 226 Yonge Street, Toronto, will build a sub-station at the St. Lawrence market to be of steel and concrete construction.

The Forest Wire Fence Company, Sherman Avenue, West, Hamilton, will build a large addition to its factory.

O. A. Letts, Russell Natural Gas & Oil Company, 83 Bank Street, Ottawa, is in the market for pumps, drills and other equipment.

The St. Mary's Cement Company, St. Mary's, Ont., will double the capacity of its plant.

Wrights, Ltd., will build a furniture factory on Charlotte Street, Sydney, N. S., to cost $25,000.

The Town Council of Beeton, Ont., will purchase boiler and power house equipment. Joseph Wright is clerk.

The Doty Engine Company, Goderich, Ont., is in the market for two turret lathes for the manufacture of shells.

The Shull Lumber & Shingle Company, Ltd., Vancouver, B. C., has been incorporated with a capital stock of $200,000 to manufacture lumber, shingles, bolts, etc.

The Grand Forks Furniture & Hardware Company, Ltd., Grand Forks, B. C., has been incorporated with a capital stock of $25,000 to manufacture electrical and other machinery, farm implements, furniture, etc.

The ratepayers of Listowel, Ont., have passed a by-law to grant $12,000 for the erection of a hydro-electric distributing plant and waterworks system.

The ratepayers of Whitby, Ont., have passed a by-law to grant $8,000 for extensions to the electric light plant.

Bids will be received by the Berlin, Ont., City Council until Sept. 7, for the erection of sewage disposal works, including tanks, filters and pumping station. Herbert Johnston is city engineer.

In addition to the 400-ft. extension to the plant of the Steel Company of Canada, Hamilton, in which have been installed a number of presses for making shells, the company is at work on a new open-hearth furnace for the purpose of supplying raw material for shell making.

The T. & K. Industries, Ltd., Montreal, has been incorporated with a capital stock of $50,000 by Henry J. Trihey, Peter Bercovitch, Ernest Lafontaine and others to manufacture machinery, tools and hardware.

La Compagnie d'Appareils Automatiques, Limitée, Montreal, has been incorporated with a capital stock of $200,000 by Victor Lemay, Pierre Christie, Maurice Loranger, and others, to manufacture automatic machinery.

The Ideal Incinerator & Contracting Company, Ltd., Toronto, has been incorporated with a capital stock of $250,000 by George E. Farley, 77 Glendale Avenue; Richard T. Shillinglaw, 339 Royce Avenue; Allan E. McFaul, 252 Sherbourne Street, and others, to manufacture boilers, engines, etc.

Government Purchases

WASHINGTON, D. C., Aug. 30, 1915.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until Sept. 14, schedule 8714, for eight chain hoists for Brooklyn, N. Y.; until Sept. 21, schedule 8734, for two forced draft blowers, one ash hoist engine, one feed water heater, one fuel oil heater and one fuel oil pump, all for Philadelphia; until Sept. 28, schedule 8730, for one gage testing machine for Puget Sound and schedule 8731, for one yoke riveting machine for Mare Island.

The Bureau of Yards and Docks, Navy Department, Washington, D. C., will receive bids until Oct. 16 for furnishing and installing the piping, pumps, boilers, heaters, buildings, etc., for four fuel-oil storage stations at Bremerton, Wash., Mare Island, San Diego and Norfolk.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, Aug. 24, for supplies for the navy yards as follows:

Schedule 8627—Ordnance.

Class 71, Washington—Three motor-driven lathes. Bid 96, $2,546; 161, $3,829.

Class 72, Washington—Two lathes. Bid 142, $952.71; 164, $725.

Class 73, Washington—One upright drilling machine. Bid 1, $95; 44, $95; 96, $96.

Class 74, Washington—Eight vertical drilling machines. Bid 1, $1,680; 44, $1,680; 96, $1,364; 122, $1,707 and $1,034.

Class 75, Washington—Two hand milling machines. Bid 96, $230.

Class 76, Washington—Two milling machines. No bids.

Schedule 8637—Ordnance.

Class 141, Washington—One motor-driven press. Bid 10, $1,700, $1,750 and $1,775; 60, $2,450; 63, $1,050, $769 and $719.

The names of the bidders and the numbers under which they are designated in the above list are as follows:

Bid 1, Aumen Machinery Company; 10, E. W. Bliss Company; 44, James Clark, Jr., & Co.; 60, Waterbury Farrel Foundry & Machinery Company; 63, Ferracute Machine Company; 96, Kempf Machinery Company; 122, D. Nast Machinery Company, 142, Rivett Lathe & Grinder Company; 161, Sherritt & Stoer Company; 164, Swind Machinery Company.

Sulphuric Acid and Pyrites in 1914

Sulphuric acid production in the United States in 1914, according to W. C. Phalen of the United States Geological Survey, was 3,762,417 net tons of 50 deg. acid valued at $24,163,331. This is exclusive of 21,993 net tons of fuming acid valued at $316,596. That made at copper and zinc smelters in 1914 was 950,798 tons of 50 deg. acid, compared with 790,296 tons in 1913.

The output of pyrites in the United States in 1914 was 336,662 gross tons, valued at $1,283,346 against 341,338 tons in 1913, valued at $1,286,084. Virginia is the leading producing State, with California second. Imports of pyrites for consumption in 1914 were 1,026,617 gross tons, valued at $4,797,326. The increase over 1913 was notable, being 176,025 tons.

Up to the end of July 9,350,000 persons had passed through the turnstiles of the Panama-Pacific International Exposition. The income from admissions from Feb. 20 to July 11 amounted to $1,568,126.80. The receipts from concessions amounted to $676,810.02; the miscellaneous income was $775,337.40. The gross income since the opening on Feb. 20 until July 11 was $3,020,274.22.

Our cryolite imports in 1914 were 4612 gross tons, with an average value of $20.47 per ton. It is an important ore of aluminum and comes exclusively from Greenland.